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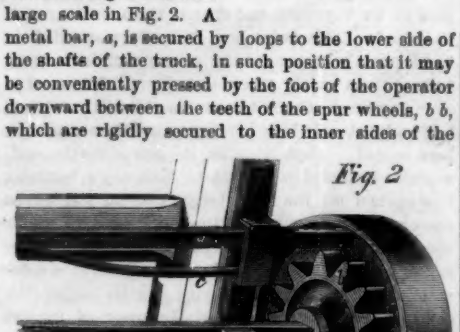
Improved Store Truck.

One of the most convenient implements in use is the store truck, which is a small two-wheeled wheelbarrow used for moving heavy bales and cases of merchandise across the floor in warehouses. It is an indispensable article in all wholesale establishments, and had it been patented by the original inventor he could have hardly failed to make a fortune by it. One of the members of a leading New York firm has recently invented an improvement in the store truck which has been patented by the firm, and which in the hands of competent business men will probably yield a handsome sum to the patentees.

The manner of loading the store truck is plainly shown in the annexed engraving, Fig. 1. The thin iron plate upon the lower end of the truck is pressed under the edge of the bale or box, and then the bale is tipped forward upon the truck. Heretofore, two men have generally been required to load a heavy bale or case, one to hold the truck firmly from running back on the smooth floor and the other to tip the bale over. The improvement here illustrated consists in a simple device for readily locking the wheels so that the truck will not run backward; thus enabling one man to load it with perfect ease.

The locking device is shown in Fig. 1 and on a large scale in Fig. 2. A metal bar, *a*, is secured by loops to the lower side of the shafts of the truck, in such position that it may be conveniently pressed by the foot of the operator downward between the teeth of the spur wheels, *b b*, which are rigidly secured to the inner sides of the

Fig. 2



truck wheels. The bar, *a*, as soon as it is relieved from the pressure of the foot is forced upward by the spring, *c*, from between the teeth of the spur wheels, thus unlocking the truck wheels.

It will be perceived that the position of the bar, *a*, is such that the same pressure of the foot which forces it downward between the teeth of the spur wheels also helps to hold the truck firmly against the lower end of the bale, and braces the body of the operator as he tips the upper end of the bale forward.

This improvement was invented by Alexander Douglas; the patent was issued July 15, 1862, to Douglas & Sherwood, who may be addressed for further information in relation to the matter, at 51 and 53 White street, New York.

Fig. 1.

DOUGLAS'S STORE TRUCK.

Destruction of Grain by Insects.—Dr. Walsh, in a lecture lately delivered at Chicago, on destructive insects, said: When it was determined to plague the Egyptians lions and tigers were not sent, but flies, lice and locusts. The great American plague, appearing annually, is the plague of insects. America is known as the land of insects! The annual destruction of wheat in New York by one insect—the wheat midge—is calculated at $15,000,000. For every dollar's worth of wheat the New York farmer harvests this midge takes a dollar's worth, being one-half of the crop. This midge comes from England, but there it is recorded that in the worst year of the ravages it only destroyed one-twelfth of the crop.

The Boston *Courier* states that Mr. Asaph Hall, the able assistant astronomer at the Harvard College Observatory, is about leaving to join the astronomical corps at the National Observatory in Washington.

Wilson's Knitting Machine—One of the Best Inventions of the Age.

An improved circular machine for knitting complete stockings without seams is now in operation at Gibbs Building, First street, Williamsburgh, L. I., and several of the same class are in operation at Pittsburgh, Mass. It is the invention of James G. Wilson, No. 48 Pine street, this city. It has a small rotating vertical cylinder, about four inches in diameter upon which the stockings are knit, and which has seventy-two spring-hooked needles secured in grooves. Twenty-five separate threads of worsted yarn are fed at once upon the needles, and twenty-five loops are made during every revolution of the cylinder. When driven at the usual speed of five hundred revolutions per minute it forms twelve thousand five hundred loops in the same space of time, and it knits a stocking in four minutes. It turns the heel and forms the toe, making each stocking the precise shape of the foot. The twenty-five threads are fed to the needles by three series of horizontal feeders, and the yarns pass through eyes to the hooks. These yarn guides and feeders while they supply the threads for new loops also close the hooks of the needles and deliver the loops which have been previously formed. The needles have an intermittent vertical and also a rotary motion in making and delivering loops. Two reciprocating pressers operate inside of the stocking cylinder, and obviate the use of a weight upon the stocking. One presser has an elastic face by which the loops are kept smoothly in place and also freely delivered. The form of the stocking is secured by a pattern wheel having inclined guides on its rim. As this wheel rotates, in conjunction with the cylinder, the inclined guides operate an arm that stops the cylinder when the attendant shifts the operation converting it into a reciprocating motion in forming the heel and also the toe; but the cylinder revolves when the leg and the middle part of the foot are being formed. When a thread breaks a stop motion throws the machine out of gear, and thus drop stitches in the stocking are prevented. This knitting machine is quite small, compact and simple, and is extensively employed in knitting superior army stockings.

A railway has been built in New Zealand about 14 miles in length, rising in that distance 2,800 feet.

NOTES ON NAVAL AND MILITARY AFFAIRS.

THE ENEMY'S PLAN.

Our last week's account left the armies of Pope and Lee forcing each other on opposite sides of the Rappahannock river, 51 miles southwest from Alexandria, on Saturday 23d of August. It now seems that a heavy force had been previously detached by General Lee, and sent under the orders of General T. G. Jackson (the famous and able "Stonewall" Jackson), and of General Longstreet, to make a wide circuit to the west, and coming down in the rear of Pope, to cut off his communications with Alexandria; while Lee should advance and overwhelm him with the main Rebel army.

JACKSON'S PART OF THE PLAN ABLY EXECUTED.

The energetic Jackson proceeded with his corps some 40 miles to the west beyond the Blue Ridge into the valley of the Shenandoah, and marching down this valley 30 miles, turned sharply to the right, and passing through a gap in the Blue Ridge, and through another gap in the Bull Run Mountains, came down upon the railroad in Pope's rear at Bristow Station and Manassas, on Tuesday evening August 26th. This is the course of one corps of Jackson's army, but another portion marched down on the east side of the Blue Ridge, and joined the first as they came through. Manassas is 27 miles from Alexandria, and Bristow is the next station, four miles beyond.

ATTACK ON BRISTOW AND MANASSAS.

The advanced cavalry of Jackson's corps dashed in upon the railroad, 12 miles of which was being guarded by a regiment of Pennsylvania cavalry, dispersed our cavalry and seized a large quantity of clothing and provisions which had been collected for the use of our soldiers. The clothing they immediately put on in place of their own worn garments, and the supplies which they could not carry off they destroyed. They also tore up the rails of the road, and burnt the cars, locomotives and bridges.

Our most serious loss, however, was a number of cannon, stated by some accounts as high as nine, which the enemy seized with their ammunition and turned upon our troops.

THE SKIRMISH OF THE NEW JERSEY BRIGADE WITH THE REBELS.

When our commanders on the Alexandria side of this break in the communications learned the fact, the first New Jersey Brigade was sent down to drive off the enemy; it being supposed that only a small cavalry force had made the attack. But the brigade was lured into the midst of overwhelming forces and suffered severely.

On Wednesday, the 27th, at two A. M., General Taylor, of Slocum's division, Franklin's corps, then lying four miles from Alexandria, received orders to move and drive away the enemy from Manassas, which place they occupied early in the night after their successful raid upon Bristow Station. This brigade consisting of the First, Second, Third and Fourth New Jersey regiments, under General George W. Taylor, proceeded, in accordance with their orders, to the bridge called the Long Bridge, where a skirmish ensued with the enemy's pickets, stationed on the opposite side. As a matter of course, the rebel pickets retired, but for the purpose of leading our forces into new and untold dangers and destruction only. The Jersey brigade crossed the bridge, without advanced skirmishers, about ten o'clock, following the rebel pickets to Manassas plains, which position they were ordered to occupy.

Arriving within sight of the extensive plain, one battery opened upon our column, which had formed in *echelon*. The General ordered his men forward with a dash to take the battery which had already, in its commanding position, commenced to mow down his men, having no idea that others were in readiness to be opened at a favorable opportunity. Proceeding under a hot fire from the first battery, and still beyond musket range of the enemy, the gallant Jersey boys, in obedience to orders, marched forward. They had not proceeded many rods before a second battery opened a cross fire upon them, which, in their peculiar formation, swept their ranks, but did not throw them into confusion, though they were too far distant to return the compliments of the rebels with their long range guns.

General Taylor had not a single piece of artillery nor a squad of cavalry in his column during the entire affair. The Third battery of artillery did not make itself known until our forces had advanced a mile and a half upon the plain from where they encountered the batteries Nos. 1 and 2. The ordnance used by the Confederates was that taken from us at Bristow's, and the missiles discharged were grape and canister.

This third murderous and destructive fire from the batteries of the rebels showed the utter folly of any further attempt to hold the plains of Manassas, so the brigade fell back by an about face movement, having inflicted little or no loss to the enemy, save, perhaps, in the skirmish at the bridge.

The brigade retired in good order under the enemy's fire until they reached Bull Run. At this place there was considerable confusion and panic. This was, however, owing partly to the arrival, at an inopportune moment, of the Eleventh and Twelfth Ohio, who had been sent to support the Jersey brigade. When the regiments debouched they became mixed, but this was soon remedied. We lost in this engagement about 500 prisoners, who were released, however, on parole. General Taylor was mortally wounded.

GENERAL POPE'S MOVEMENTS.

During Jackson's long march General Pope was slowly falling back along the railroad to form a junction with the reinforcements which were coming down from Alexandria, and he had reached Warrenton Junction, 10 miles from the Rappahannock, when he learned the arrival of Jackson's division in his rear. At this time Pope's army was spread from the railroad northwest 8 miles along the Warrenton branch to Warrenton; this disposition having apparently been made to prevent the flank movement of Jackson which was executed by a longer circuit. The following dispatch of General Pope gives a brief history of his next movements :—

MANASSAS JUNCTION, August 28.

TO MAJOR-GENERAL H. W. HALLECK :—

As soon as I discovered that a large force of the enemy was turning our right toward Manassas, and that the division I had ordered to take post there two days before had not yet arrived from Alexandria, I immediately broke up my camp at Warrenton Junction and Warrenton, and marched rapidly back in three columns.

I directed McDowell, with his own and Sigel's corps, to march upon Gainesville by the Warrenton and Alexandria pike; Reno and one division of Heintzelman to march on Greenwich, and with Porter's corps and Hooker's division I marched back to Manassas Junction.

McDowell was ordered to interpose between the forces of the enemy which had passed down to Manasses through Gainesville, and his main body moving down from White Plains through Thoroughfare Gap. This was completely accomplished, Longstreet who had passed through the Gap being driven back to the west side.

The forces to Greenwich were designed to support McDowell in case he met too large a force of the enemy. The division of Hooker, marching toward Manassas, came upon the enemy near Kettle run on the afternoon of the 27th, and after a sharp action routed them completely, killing and wounding three hundred, capturing camps and baggage and many stand of arms.

This morning the command pushed rapidly to Manassas Junction, which Jackson had evacuated three hours in advance. He retreated by Centerville, and took the turnpike toward Warrenton. He was met six miles west of Centerville by McDowell and Sigel late this afternoon. A severe fight took place, which was terminated by darkness. The enemy was driven back at all points, and thus the affair rests.

Heintzelman's corps will move on him at daylight from Centerville, and I do not see how the enemy is to escape without heavy loss. We have captured one thousand prisoners, many arms and one piece of artillery.

JOHN POPE, Major General.

The truth of this dispatch has been since confirmed by the more reliable accounts of correspondents. We make this remark in consequence of the reputation which Gen. Pope has earned by his famous dispatch from the South of Corinth announcing his capture of 10,000 prisoners and 10,000 stand of arms, which was a simple falsehood.

By examining the map it will be seen that this movement of Pope drove the enemy from the railroad toward the west, our forces stretching round Jackson's corps to the east and south, while McDowell's corps was beating back Longstreet's division through the gap in the Bull Run Mountains at the west. Thus affairs stood at the close of Thursday, Aug. 28th.

THE GREAT BATTLE OF FRIDAY.

It was now manifestly Pope's design to overwhelm Jackson before the arrival of reinforcements. McDowell was accordingly instructed to hold Longstreet in check, and Gen. Banks was stationed at Manassas Junction to prevent Lee from coming up in the rear while the other divisions were hurled against Jackson's army. The following is General Pope's account of the battle :—

GROVETON, NEAR GAINESVILLE,
August 30, 1862.

TO MAJOR-GENERAL HALLECK :—

We fought a terrific battle here yesterday with the combined forces of the enemy, which lasted with continuous fury from daylight until after dark, by which time the enemy was driven from the field, which we now occupy.

Our troops are too much exhausted to push matters, but I shall do so in the course of the morning, as soon as Fitz John Porter's corps comes up from Manassas.

The enemy is still in our front, but badly used up.

We have lost not less than eight thousand men killed and wounded, and, from the appearance of the field, the enemy have lost at least two to our one. He stood strictly on the defensive, and every attack was made by ourselves.

Our troops have behaved splendidly.

The battle was fought on the identical battle field of Bull run, which greatly increased the enthusiasm of our men.

The news just reaches us from the front that the enemy is retreating toward the mountains. I go forward at once to see.

We have made great captures, but I am not able yet to form an idea of their extent.

JOHN POPE, Major General Commanding.

THE GREAT BATTLE OF SATURDAY.

On Saturday morning the battle was renewed, and in the course of the day we drove the enemy back some two miles, but Pope discovered that instead of a mere corps of Jackson's he had the whole rebel army of Gen. Lee before him, greatly outnumbering the divisions of our troops on the ground. At about 4 o'clock in the afternoon Gen. Lee concentrated his reserves in an attack on Pope's left wing under McDowell, and this unfortunate commander was obliged to fall back. In the course of the evening the other divisions were also drawn back by General Pope to Centreville; leaving our dead and wounded on the field.

ARRIVAL OF REINFORCEMENTS.

Early on Sunday the corps of Generals Sumner and Franklin arrived from Alexandria. There was but little fighting during this day, both armies resting after their terrible fatigues.

FALLING BACK ON MONDAY.

On Monday General Pope learned that an attempt was to be made to again turn his right wing and fall upon his communications. He accordingly fell back from Centreville to Fairfax Court House. During this operation the enemy made an

ATTACK ON RENO'S DIVISION.

As this division was pursuing its line of march, and when within one mile and a half of Fairfax Court House, a heavy volley from a force of riflemen came pouring in upon them from the woods to the right of the road. This occurred at 4 P. M. The rebel force was a detachment from Gen. Hill's division, and was commanded by Gen. Stewart. The volley was almost entirely received by Gen. Steven's brigade, composed of the 28th Mass., 8th Mich., 50th Pa., 100th Pa., and 46th N. Y. Reno and Stevens immediately formed their commands in line of battle to repel the attack of the enemy, now concealed in the thick shrubbery of the woods. Gen. Stevens rode up and down his lines gallantly, rallying his men, intimidated by repeated volleys from an unseen enemy. Unable to cope with them in the position they then held, Gen. Stevens ordered his men to fix beyonets and charge them out through the woods. This order was gallantly responded to by his men, who pressed the enemy and drove them before them with great slaughter. While thus charging them, Gen. Stevens was hit with a Minié ball and instantly killed, but not until the enemy had been routed. Capt. Stevens, the son of the General, was also wounded in the hand. Kearney's batteries now opened on the rebel forces, causing sad havoc among the rebel ranks. Skirmishing was kept up for about three hours, when the enemy retreated, and the trains passed on unmolested. General Stevens commanded one of the surveying parties across the continent, and was afterward Governor of Oregon Territory.

BURYING THE DEAD.

On Monday, at 1 o'clock, General Pope sent a flag of truce to General Lee, with a party to take care of the wounded and bury the dead. It is estimated that 1,800 bodies of our soldiers who had given up their lives for their country, were lying upon the battle field. The enemy's dead had been buried in the night by negroes, the rebel generals very shrewdly sparing their troops the most disheartening of all services that fall to the soldier's lot—that of burying

the pale corpses of their comrades. In this respect, as in all others, the rebel generals seem to show a marked superiority over those in the Union armies.

CITY POINT DESTROYED BY UNION GUNBOATS.

City Point has been entirely destroyed by the Union gunboats. For some time past the rebels have been firing into the transports passing up and down the James river. Commodore Wilkes sent the rebels word that if it was not discontinued he should destroy their rendezvous, City Point. On Thursday August 28, the rebels brought down to City Point eight cannon and about two hundred riflemen, and opened fire upon the Union flotilla, which at the time was abreast of the place, whereupon our gunboats opened fire upon them and demolished every building in the place, and dispersed the rebel force.

DISASTERS AT THE WEST.

At the same time with the great reverses in Virginia, we have the news that Lexington, Ky., was abandoned to the rebels on Monday, Sept. 1st., and that Cincinnati was threatened and placed under martial law. Tremendous excitement prevailed at Louisville, and the whole community was called upon to aid in defence of the place.

CARE OF THE FEET.

We have received from the publishers, Bradley & Webb, of Cincinnati, a pamphlet of 111 pages on the Causes and Cure of Diseases of the Feet, with Practical Suggestions as to their Clothing, by C. H. Cleaveland, M. D.

It discusses elaborately and with apparent intelligence the various diseases of the feet with their treatment. We give the following extracts as being of general interest :—

CLOTHING OF THE FEET.

From the first wearing of socks and shoes, great care and attention are requisite. In childhood, the socks in summer should be made of fine cotton or silk, in cold weather of a woolen fabric, and of sufficient length that every toe may have room to extend itself.

The feet should be washed evening and morning, the same as are the hands, and wiped thoroughly dry, particularly between the toes, and the nails should not be cut too often, nor at any time shorter than to be on a level with the tops of the toes. It is also advisable that the shoes be a size larger than the foot, and made of soft leather.

WASHING THE FEET.

In addition to washing the feet, as recommended above, it is quite necessary that foot baths should be resorted to in a great variety of conditions of the feet. Ordinarily the proper time for taking a foot bath is at night, just before retiring to rest ; but under peculiar circumstances, to be mentioned, they may be demanded at other times in the day.

The employment of foot baths, whether hot or cold, must depend greatly on the difference of constitution and habit. For persons advanced in age, the tepid bath is preferable, particularly if they are subject to gout or rheumatism. Any sudden change of temperature in such cases might do harm, and the feet ought not to be put into water of any kind while the patient is actually suffering from either of those disorders, except by the direction of the medical attendant.

In advanced age persons should not generally bathe the feet ; they would, however, derive great comfort from sponging them once or twice a week, or oftener, with soap and warm water, wiping them thoroughly dry immediately afterward, then using the flesh brush or the hand and rubbing off the loose cuticle or scales with a coarse towel. When there is an accumulation between the toes, a fine cloth, wetted with eau de Cologne or any other spirit, may be drawn backward or forward between them two or three times a week.

Adults in good health may bathe their feet every morning with cold water, wipe them thoroughly dry afterward, and then rub eau de Cologne freely over them with the palm of the hand. When dressing for dinner the feet should be washed with soap and water in the same manner as the hands.

EXTIRPATION OF CORNS.

Extirpation of corns, by the chiropedists, is usually effected by a careful process of cutting and tearing out the central portion of the corn, while the circumference of the diseased part is left to serve the purpose of taking off pressure from the more tender portion at the seat of the disease. Some of these peripatetic operators make use of the tincture of iodine or some other substance that will produce a stain of the surface, under pretense of using some secret means to deaden the sensibility of the parts, but such washes do no good. A continued use of some solution of iodine, with the removal of all pressure, will, in time, cure some corns, and especially the softer ones, but acetic acid of the proper strength is preferable.

The only sure and complete cure for a corn is its complete removal, and the wandering chiropedists either have not skill or have not patience sufficient to produce this result, and hence seldom or never produce a radical cure. After a hard corn has been extirpated, acetic acid, or a solution of iodine should be applied to the part, until all remains of the disease have disappeared. Even then, if pressure is allowed, a new corn is quite liable to occupy the seat of the old one.

TREATMENT OF BLISTERS.

In marching, if blisters rise on the toes or heel, they should at once be punctured with a needle, passing the needle a little distance under the sound skin so as to produce a valvular opening to prevent the introduction of air as the fluid passes out. If not sooner attended to, all blisters should be opened in the evening after the foot bath, and the fluid gently pressed out, and then the patient assuming the horizontal position they may not fill up again, and by morning they may be nearly or quite well. Sometimes blisters form on the end of the toes, or on the heel, and the person is not required to resume the march on the following day. In such cases it may be as well to let such blisters remain unopened, and as the water is absorbed and the dead skin becomes dry it should be removed.

Production of Cork.

In the "Mémoires de la Société de Physique" of Geneva, is an interesting paper by M. Casimir de Candolle on the growth of cork. Although this useful substance exists in varying quantity in the bark of all phanerogamous plants and in several cryptogamous, yet for commercial purposes it is wholly procured from two species of oak, *Quercus occidentalis*, growing in the south-west of France and in Portugal, and from *Quercus Suber* (the cork tree), growing in the south east of France, in Italy, in Algeria, and in the isles of the Mediterranean. The acorns of the former species take two years to ripen. In 1859 M. C. de Candolle, while staying in Algeria, studied the development of the bark of the latter species. It is composed of four layers—the epidermis, the corky envelope, the cellular envelope, and the liber which covers the soft wood. These four parts increase independently of each other year by year. In the third or fourth year the epidermis, having attained the limits of its elasticity, splits longitudinally, and a marked change takes place in the corky envelope, which gradually takes up the appearance of true cork : new layers are produced, and the transformation of cellulose into cork steadily goes on. The cork thus naturally developed has no commercial value. It is termed "male ;" and the first act (*démasclage*) of the cultivator is to separate it from the trunk, which thus leaves exposed the liber, termed "mother." The tree is then left to itself, and the cork begins to grow again, while the sap is flowing in consequence of the exposure of the liber. If a trunk left in this state several months be cut down, in the section a ring of cork will be found formed in the interior of the "mother," at a variable distance from the surface of the trunk. All the exterior portion of the "mother" is dead, and splits as the tree grows, and the interior portion (new cork, termed "female") is developed. This "female" cork grows in the same manner as the "male," that is, by the addition of annual layers on the internal surface ; but it is much finer and more elastic, and is the cork of commerce. These various stages of growth are exhibited in a series of beautiful plates. In the course of his researches M. de Candolle was led to observe the importance of the desiccation of the "mother," and to infer that, in proportion as this desiccation could be hastened, so much sooner would fresh layers of cork be produced. This idea he found to be correct. He observed several trees in which fires, after having charred the male or female cork, had determined the formation of a layer of female cork in the interior of the "mother." He states that he has seen a specimen, composed of three layers of "female" cork, separated by little zones from the "mother ;" the fourth layer, which enveloped the whole, having disappeared in consequence of the fire. The thickness of these zones, increased by the application of boiling water, does not diminish by cooling. Other peculiarities of this remarkable substance are noted in the memoir.

Extracts for Young Men.

Give a young man a taste for reading, and in that single disposition you have furnished him with a great safeguard. He has found at home that which others have to seek abroad, namely, pleasurable excitement. He has learned to think even when his book is no longer in his hand, and it is for want of thinking that youth go to ruin.

Some of those who have been most eminent in learning and science made their first attainments in snatches of time stolen from manual employment. Hans Sachs, the poet of the Reformation, and the Burns of Germany, began life as did Burns, a poor boy ; he was a tailor's son and served an apprenticeship, first to a shoemaker and afterward to a weaver, and continued to work at the loom as long as he lived. The great dramatist, Ben Johnson, was a working bricklayer, and afterward a soldier. Linnæus, the father of modern botany, was once on the shoemaker's bench. Our immortal Franklin, it need scarcely be said, was a printer. Herschel, whose name is inscribed on the heavens, was the son of a poor musician, and at the age of fourteen years was placed in a band attached to the Hanoverian guards. After going to England he undertook to teach music, and then became an organist. But while he was supporting himself in this way he was learning Italian, latin and even Greek. From music he was naturally led to mathematics, and thence to optics and astronomy. John Dollond, the inventor of the achromatic telescope, spent his early years at the silk loom ; and continued in his original business even for some years after his eldest son came to an age to join him in it. Few cases are more celebrated than that of Gifford, the founder and editor of the *Quarterly Review*. He was an orphan, and barely escaped the poor-house. He became a ship boy of the most menial sort on board of a coasting vessel. He was afterward for six years apprenticed to a shoemaker. In this last employment he stole time from the last for arithmetic and algebra, and for lack of other conveniences, used to work out his problems on leather with a blunted awl. Few names are more noted in modern literature.

Government Tax on Gas.

OFFICE OF THE NEW YORK GAS LIGHT COMPANY, August 1, 1862.

In conformity with the act of Congress, the United States tax of one and one-half cents per hundred cubic feet, will be added to all bills for gas consumed after the first day of September next. THOMAS K. LEES, Secretary.

The above notice has been left at our office and at the dwellings, stores, shops and offices of all gas consumers in this city. Now, we object to the Gas Companies in this or any other city transferring Government tax from themselves to the consumers. It was not the intention of the framers of the law that the consumers should pay this tax, but that the companies who furnish the gas should pay it as their proportion of the income tax. If the consumers are obliged to pay the tax, the Gas Company is relieved from the assessments which nearly all other classes in the community are unable to shirk.

The Great Exhibition as Seen by a Votary of Science

On another page will be found a very interesting letter from London describing some of the most important articles to be seen at the Great Exhibition. The writer is a distinguished scientific gentleman who is spending a few weeks abroad, and his impression of the Exhibition and a description of what he saw will be found of interest.

ILLINOIS STATE FAIR POSTPONED.—The annual State Fair of Illinois, which was to have been held at Peoria, on the 16th of this month, has been postponed until next year on account of the grounds upon which it was to have been held being taken possession of for military purposes.

AN EXAMINATION OF POMPEIAN GLASS.

BY M. G. BONTEMPS.

Window glass, the utility of which is appreciated chiefly in northern countries, does not seem to have been used in remote antiquity. The silence of ancient Greek and Latin authors on the subject is a sufficient proof that it was unknown in their time; and, in any case, the wonderful expertness evidenced in glass manufacture many years before the Christian era, renders it surprising that no one thought of making glass windows. The first mention of them we find in the first century of the Christian era. Philon, a Jew, in the account of his embassy to the Emperor Caligula, has a passage relating to glass windows. On the other hand, Seneca assures us that glass windows were first adopted in his time. These assertions have long been disputed. Certain commentators argue that these windows were nothing but trellises, or a kind of Venetian blind, made of wood; others maintain that they were made of a fine talc, called specular stone; but since the discoveries at Herculaneum and Pompeii, there can no longer be any uncertainty touching this point. The architect Mazois, in his remarkable work on "The Ruins of Pompeii" (Paris, 1814, 1835, four vols. in folio), expresses himself thus (Vol. ii. p. 77, chapter on "Public Baths"):—

"If the question of the use of window glass among the ancients were still doubtful, we should find in this room evidence adequate to resolve it; for here has been preserved for centuries a bronzed sash filled with glass, showing not only the size and thickness of the panes employed, but also the manner of adjusting them. The figures 4 and 5, which give the appearance and the details of the sashes, show that the glass was fitted into a groove, and secured at certain distances by turning buttons, which pressed upon the pane and fixed it. The panes are 20 inches broad (0.54 millimètres), about 28 inches (0.72 millimètres) high, and more than 2 lines (5 to 6 millimètres) thick."

The employment of window glass at an epoch anterior to the year 79 of our era, the date of the eruptions of Vesuvius which buried Herculaneum and Pompeii being ascertained, glass workers became much interested in finding out how these panes, which are of considerable size, were made—whether they were blown into cylinders or plates, or whether they were cast in the same way as a mirror. I could clear up this point only by inspecting the fragments. These panes, which, from their size, could weigh not less than five kilogrammes, if blown could not have been the product of a single lifting of glass; for in this case we ought to be able to distinguish the glass of the different liftings. Were these panes formed by blowing a cylinder, afterward cut and spread out, the bubbles contained in the glass would be long and parallel with the axis of the cylinder. They would have been concentric if the panes were formed from a globe converted into a plate; and if the panes were molded the bubbles could have no uniform direction, but would be generally round and flat. Uncertain when I could go and personally examine the fragments of window glass found at Pompeii, I begged the Minister of Foreign Affairs to ask the Consul of Naples to entrust me with a few of these fragments; and a few weeks afterward the Minister informed me that the intervention of the Consul M. de Soulanges Bodin had been successful; that, in fact, the Superintendent General of the Museums of Naples, M. le Prince de San Giorgio, appreciating the usefulness of my investigations, would be happy to place at my disposal the fragments of window glass found at Pompeii.

These fragments measured ten centimètres, and after their examination, no doubt could remain of the manner in which the panes were made. The glass was cast free from knots and other imperfections; portions were free from bubbles; while in other parts these were present in great quantities, but not all caused by fusion. The thickness of the glass was unequal, in some places being five millimètres thick, and in others only three. This sign alone would not show that the panes were not blown. One surface bore the impression of the floor on which it was laid when hot. This might be the mark of the refractory stone on which the cylinder was spread, but the opposite surface did not resemble blown glass. Moreover, there were other indications yet more reliable showing that this glass was not blown. The bubbles were the result neither of a cylinder nor of a globe spread into a plate. It was evident that each pane had been cast; that this casting had not in some parts been carried sufficiently far; and that in others, on the contrary, the workman having reached the limit in this respect, has returned the glass on itself, and thus led to the interposition of air and the formation of a bed of bubbles. The unequal thickness shows that a metallic cylinder was not used to press upon the glass.

It is, then, probable that a metallic frame of the size of the pane it was desired to obtain—say 0.72 by 0.54 millimètres—was placed on a polished stone, slightly powdered with very fine argil. Into this frame the glass was then poured, taken from the crucible in spoons, probably of bronze, or even with canes, and the glass was pressed with a wooden pallet, so as to make it fill the mold. The ancients then came very near the invention of plate glass, which was not in vogue in France till seventeen centuries later; for they had only to pass a roller over the frames to obtain panes of equal thickness, which would then have required nothing but polishing—an operation familiar to them; for Pliny, in his "History of the World," says that obsidian was used as mirrors, and it is evident that it must have been previously polished.

The Pompeïan window glass is of a bluish green tint, like the common glass fifty years ago. The analysis made for me by M. Fred. Claudet, and of which I can consequently guarantee the exactitude, gave the following result:—

Silica	69·43
Lime	7·24
Soda	17·31
Alumina	3·55
Oxide of iron	1·15
Oxide of manganese	0·39
Oxide of copper	traces
	99·07

This analysis is remarkable, since it coincides exactly with that of the glass now made. In fact, take the analysis of window glass made by M. Dumas, and we find:—

Silica	68·65
Lime	9·65
Soda	17·70
Alumina	4·00

In the latter analysis, perhaps some traces of iron and manganese have been disregarded; but independently of these two elements, it is to be observed that the two analyses are almost identical.

I ought to state that the glass analysed by M. Dumas was not so good as now generally made. The window glass used at present gives on an average the following:—

Silica	72·50
Lime	13·10
Soda	13·00
Alumina	1·00
Oxides of iron and manganese	0·40
	100·00

REFINING PETROLEUM.

The following description of refining petroleum, and crude coal oil is from the *Philadelphia Coal Oil Circular*:—

The crude oils may at once be submitted to chemical treatment; but as a general rule, and especially when they are heavy and contain much tar, they should be first distilled. This distillation is made in a common iron still, protected from the action of the fire by fire brick, which equalizes the heat, consequently the expansion of the metal, and lessens the risk of fracture.

The "change" of oil prepared as above, may be run into the still and distilled without the use of steam. But when it has been "run off" to four-fifths of the whole quantity, or when the part remaining in the still will be a thick pitch when cold, common steam should be gently let into the neck or breast of the still. The steam immediately produces an outward current through the condensing apparatus, and brings over all the remaining part of the oils, leaving a compact coke as the only residuum. Furthermore, it gradually diminishes the heat of the iron and prevents it from breaking. When the steam is thus let in, the fire is to be removed from beneath the still.

Common steam under moderate pressure has been introduced into stills, both above the charge and into it throughout the entire distillation. In the latter instance the steam soon becomes superheated after the lighter oils have been run off. Again, steam previously superheated is driven into the charge during the distillation, and for the distillation of the heavy oils and paraffine this mode has the preference; yet steam is advantageous however applied. When it is superheated the condensing apparatus should be extensive.

In the first distillation of the crude oils, as they come from the retorts, and in subsequent ones, the oils may be slowly admitted into the stills after it has become sufficiently heated and the oils begin to flow freely from the worm or condenser. By the adjustment of a cock, a stream of the crude product may be permitted to flow through an iron tube into the still while it is in operation. The tube should dip beneath the oil in the still, the in-flow of oil into which must not exceed the out-flow from the condenser. A greater amount of heat will be required for this operation than for the common method, as much of it is taken up by the cold oil constantly flowing inward. By this mode a still working 1,000 gallons may be made to run double that quantity without interruption, and steam may be applied in any manner before described.

The first distillate of the crude oil should be separated into two parts, each of which requires somewhat different treatment. The first part is that which distills over from the commencement of the run until the oils in the receiver have a proof of 36° by hydrometer, or a specific gravity of 0·843.

These light hydro-carbons and the eupion they contain, form the lamp oil. The quantity produced will depend upon the quality of the coal, or, whence they have been derived. This part of the distillate being pumped from the receiving tank, the remainder, or second part, is allowed to flow on till it assumes a greenish color at the end of the worm pipe, when steam, if not previously employed, may be let into the still and continued until the whole distillation is completed; the fire in the furnace beneath the still being withdrawn. A quantity of coke will be found to remain, amounting to ten or fifteen per cent of the whole charge. When steam is not employed in the residuum the still must not be run down lower than a thick pitch. Coking in the still without steam is unsafe and hazardous to the iron.

The first part is then to be placed in an iron cistern, and therein thoroughly agitated from one to two hours, with from four to ten per cent of sulphuric acid, the object being to bring every particle of the impurities in contact with the acid. The quantity o acid to be used depends upon the character of the oils.

If two much acid is applied the oils will be partially charred and discolored; if two little, the impurities will not be oxidated, and the oils will change color. After the agitation of the oil and acid is completed, the mixture must remain at rest from six to eight hours, when the acid, with the chief part of the impurities, will have settled to the bottom of the vessel. They are then to be drawn off, and the remaining oil to be washed with ten or twenty per cent of water. The water removes a part of the remaining acid, and carries off the soluble impurities. After the water is withdrawn the charge is to be agitated two hours with from five to ten per cent, by measure, of a solution of caustic potash, or soda of specific gravity 1·400—caustic soda is generally preferred. Like the acid, the strength and quantity of the alkali must be varied according to the quality of the oils. After a repose of six hours or more, the alkali is to be withdrawn from the oil, and further impurities washed out with water. When the water is withdrawn from it, it is to be run into a still for final rectification. During the whole of these operations the oils and the several washes applied to them are to be kept at a temperature not lower than 90° Fah. This is done by means of steam coils fixed at the bottoms of the tanks in which the agitations are made. Finally, the oil is to be carefully distilled, with or without steam. A small quantity of the lightest product or eupion, which comes first from the condensing worm, is usually discolored, and may therefore be transferred to the succeeding charge.

The last distillation should be made slowly and with care, avoiding all fluctuations produced by an unsteady heat. If desired, the eupion may be taken off at the commencement of the distillation. It

should be at proof 60°, or specific gravity, 0·733, or it may be allowed to run in with the lamp oil. When the distillate has reached proof 40°, or specific gravity, 0·819, the remainder is to be transferred to the next charge, or the heavy oil, as being too dense for illuminating purposes. The mixed oils intended for lamps have their disagreeable odor chiefly removed by allowing them to remain in flat open cisterns over weak solutions of the alkalies during a period of some days. Exposure to light also improves their color. The alkalies employed in the foregoing treatment may be restored and used in subsequent purifications. The oils of the second or heavy part of the first distillate are purified by the same means as described for the lighter oils, except that they require the application of more acid and stronger alkalies. All the oils distilled from them at proof 40° are to be added to the lamp oils. At the close of each distillation, and as the oils acquire greater density, the color grows darker and changeable, finally they are partially charred, and especially when they have been distilled without steam. These dark-colored oils may always be renovated by the use of acids and alkalies, the permanganates of potash and soda, and, finally, by distillation. The color of the lamp oils should not exceed a tinge of greenish yellow, when viewed in a clear glass flask six inches in diameter. If by accident, carelessness, or negligence, the oils treated by the foregoing method should be impure, they must be submitted to washing and redistillation.

HONORS TO ENGINEERING GENIUS AND INDUSTRY.

A beautiful marble statue has lately been erected at Islington Green, London, in memory of Sir Hugh Myddelton, the goldsmith, who, in the beginning of the 17th century, carried water by a tunnel a distance of 32 miles, to supply the City of London. On the inauguration of the monument, Mr. Gladstone, the Chancellor of the Exchequer, delivered an eloquent address, from which we make the following extracts :—

It is in some respects a striking and a noval ceremony, for it is a thing completely new in the history of mankind to find statues erected in public places to engineers. If we go back to the very root and beginning of philosophy, we shall find that whatever related to mechanics and to physical forces was associated with the processes of mental inquiry. But they soon came to be divorced one from the other, and thousands of years elapsed before the engineer, as such, came to be recognized as a person having a high title to public distinction. It does not appear that the people of this country in very early times had developed much of that talent for which they are now so remarkable; but in viewing the history of the nation to which we belong we find that at a later period it has exhibited aptitudes of which there was formerly no promise. This, let me say, in passing, is a useful lesson not only for nations but for individuals, for it may teach an individual that there are many things which at present are wholly beyond his power, and for which he cannot even recognize in himself the materials of fitness, and yet to which he may thoroughly and conspicuously attain by assiduous and resolute cultivation of the faculties with which he is endowed. No doubt the engineers who, under the name of architects, erected the cathedrals of this country must have been persons of considerable ability in their profession, profound, accurate, careful and skillful in their knowledge of mechanics, but for much of that education we are indebted to foreign countries. It was, perhaps, rather an imported than an indigenous quality. But in these latter times we have seen a great change, and the engineers of this country now take their place as one of the most distinguished and most important of all classes of the community. They have fairly taken their place among the great men of England, though I do not know whether any commemoration so conspicuous as the erection of a statue to Sir Hugh Myddelton in one of the greatest thoroughfares of this vast metropolis has before been given to them. It is a fact full of meaning, an indication of the movement of the time. It is an indication, indeed, of the development of those faculties and those habits of mind and action by which man has advanced from generation to generation, fitting himself more and more, through the efforts of each successive generation, to contend with those difficulties of outward nature amidst which Providence has placed him for the very purpose of evoking his energies and of making the gifts and bounties of Providence, of which that nature is full, available for his comfort and his happiness. This is the opening, I may say, of another chapter in the history of man. Of course I do not mean that it is the beginning of such efforts, but it is the beginning of them on a new scale, with new systems, new appliances, new means of intercommunication and interchange of knowledge, with new means of carrying it on from the men of to-day to the men of to-morrow; and it marks the fact that in the list of elements that belong to human civilization, these great operations of art and science applied to the external world must henceforward be included, and must hold a conspicuous place in the record of progress. It will be our own fault if the addition of that new chapter be not a great blessing. There is no reason why it should displace anything which was formerly found there, and held a place of deserved honor. Don't let us see in the existence of a class of engineers, and in the distinctions now so universally bestowed on them, anything that need fill us with fear and apprehension as to the displacement of whatever has heretofore been done by men with respect to religion, art or ancient cultivation. All these things ought to continue, and grow, and thrive, and be added to what we have already achieved or what may yet be accomplished. The principle of the Divine life in man must always continue and rule his whole existence, if he is to exist for any purpose of good to himself or his fellow man. The cultivation of intellect, the study of that which unbounded wisdom has left to us, the cultivation of the beautiful in all its varied spheres—all these should continue to thrive; and we ought to see, without jealousy, the development of new powers of the mind of man, or new applications of its powers, in order to meet the continually unfolding wants and demands of society. It is a work which we may confidently say is acceptable to God as well as to man when water is brought from a distant spot to supply the population of this great city. It is all very well for those of us who could find water for ourselves to make light of this great appliance of modern engineering, and to say that it does not signify whether we are carried five miles or fifty in an hour, whether it costs a pound or a shilling, whether our houses are well or ill drained, or whether water from the country is to feed London or not: it is all very well for us, who have these various comforts, to assume a high and sanctimonious tone and say, "Let us not overvalue these merely temporal advantages." No doubt it is wise that the poorer classes of the community, amid the hard pressure of their daily lives, should be reminded—and I have no doubt the teachers of religion will take care to remind them—that they are not to suffer their minds to be absorbed and dried up with the contemplation of their purely physical and temporal necessitities; but that they are ever to turn an eye to God, who is in Heaven, and to keep it open for the world which is to come. But let us freely and gratfully acknowledge that men like Sir Hugh Myddelton in former times, and others whom I might name in the present day, who have devoted themselves with energy, forethought, care and skill, to the multiplication of appliances which conduce to the comfort of man, and have conquered the forces of nature, and made them subservient to human happiness, have done and are doing a great and good work before the face of Heaven as well as in the face of man; and deserve to be held in grateful honor as among the real and genuine benefactors of mankind.

Distinguished Engineer Gone.

By recent news from Europe, we learn that Alexander M. Ross, C. E., resident engineer and designer of the great Victoria Bridge at Montreal, died in England, on the 8th of August, aged 57 years. He was a native of Cromarty, Scotland, a pupil of old George Stephenson, and the companion of his great son. His engineering abilities were of a very high order, and both the Stephensons put great confidence in all he proposed and undertook to perform. He surveyed the route of the Grand Trunk Railway in Canada, and was engineer of several great undertakings. It is stated that he was a man of herculean strength, but of gentle manners, and very sensitive to defamation and censure. The Toronto *Leader* states that the cause of his death was a mental malady, traced to the attacks of an unscrupulous clique in London, led by G. R. Stephenson, a relative of the late Robert. He sought to detract from the fame of Mr. Ross by publications, claiming all the credit for Mr. Stephenson as designor of the Victoria Bridge, and censuring Mr. Ross for receiving public praise. In Canada, where he was so well known, the papers state that he was one of the most courteous and unassuming of men, and they denounce the persecution to which he had been subjected.

London Exhibition—Wave Line Models of Ships.

The following condensed from *Mitchell's Steam Shipping Journal* will be interesting to all our naval architects, shipwrights and nautical men :—

By lectures and practical demonstration Mr. Scott Russell has associated his name with the wave-line principle of ship building. Mr. Russell contributes several examples of his style at the World's Fair. Mr. Russel exhibits models of the iron paddlewheel gunboats *Bann* and *Brune*, built in 1856 for the Government. They are 287 tuns and 80-horse power. Then there is the screw *Annette*, of 845 tuns and 100-horse power, built in 1861 for A. Remington, Esq. She is full rigged, with lifting screw and classing A 1 twelve years at Lloyd's. The *Lyons* and *Orleans*, paddle boats, of 415 tuns and 160-horse power, built for the London and Brighton Railway Company, to ply between Newhaven and Dieppe, are no doubt very fast vessels, but exceedingly wet ones. The form of the bow is that of a long tapering wedge standing on its side with the sharp end as the stem. There is no rounding off for the run as the wedge is flat-floored. Another model displayed by Mr. Russell is that of the Antwerp steamer *Baron Osy* of 792 tuns and 160-horse power. This vesel seems to have been constructed to gain the greatest amount of passenger space on aggregate tunnage. Her stern post rakes aft, and is built over or outward very considerably, so that in bad weather she rolls heavily. In smooth water she is a fast and pleasant boat. The next vessel is the *Wave Queen*, paddlewheel steamer, of 250 tuns and 80-horse power, said to be the narrowest sea-going vessel for her length ever built. The *Wave Queen* was launched in 1852. She is 210 feet in length by 15 feet beam, which gives one foot of beam to every 14 feet in length. This steamer may be classed as of the race horse build, but, if she was loaded like a pack horse she would be unseaworthy. Vessels are built very long and sharp to obtain speed, and then they are loaded like collier brigs. The result is that they swim deep, and if they ship a weight of water their buoyancy is destroyed. Mr. Russell built the large screw steamships *Adelaide* and *Victoria* of 1,852 tuns and 450-horse power, for the Australian Mail Steam Navigation Company. He claims for the *Victoria* that she gained the prize of £500 offered by the Australian Colonies for the quickest passage. They are, like Mr. Russell's other ships, wall-sided and flat-floored. A model of the *Great Eastern* is also exhibited. The first plate was laid in 1853, and she was ready for launching in 1858. The *Great Eastern* is most decidedly the best of Mr. Scott Russell's models. Although she is flat floored she is rounded off from the bilge, so that the water is not driven off in a square at the bottom. The *Great Eastern's* lines have been admired by all who had the opportunity of inspecting them when she was on the ways. It would be difficult to improve them. She has a double skin, and longitudinal divisions, which makes her a strong ship.

To amalgamate the zinc of electric batteries, Mr. Berjot uses the following process :—Dissolve 7 ounces 375 grains of mercury in 3 pints 4 ounces of nitro-muriatic acid (nitric acid 1 part, hydrochloric acid 3 parts). Heat the mixture a little, and add to it 2 pints 4 ounces hydrochloric acid. The zinc is thus amalgamated in a few seconds. The above amount of mercury is enough to amalgamate 150 to 200 cylinders of zinc.

The 15th of August was designated as the day for opening the railroad from Algiers to Blidah. All of the employees wear uniforms, with their employment inscribed on the front of their caps.

Correspondence.

THE GREAT EXHIBITION AND WHAT MAY BE THERE SEEN.

London, August 5, 1862.

The great sight of London at present is of course the "Exhibition," which certainly far surpasses any expectations I had formed concerning it. The exterior of the building is plain and rough, but the interior is extremely tasty and beautiful. The general plan of the building is rectangular, 800 by 700 feet, crossed by naves and transepts, with two domes of glass, the largest hitherto constructed, viz., 250 high and 160 feet diameter. There are then, in addition, two wings or "annexes," as they are called, one 975 feet long and 200 feet wide, and the other about 800 feet. The galleries, if placed in a straight line, would extend a mile and a half, and all of this immense space is full to overflowing. If you ask me what there is decidedly new and original, I should answer, little; but, as an exhibition illustrative of the world's progress, and of the excellence attained in every branch of science and art, it is as near complete as it is possible to make it. In the machinery annexe, I did not notice a single machine which struck me as involving any decidedly new thought. Many of the wood-working machines, with which we in the United States have been long familiar as the "last-turning machine," "variety-molding machine," and others, are exhibited as new, and the English and foreign exhibitors, moreover, have received medals for them as new mechanical achievements. India rubber, of course, figures largely; then there is diamond cutting and polishing, by an old and simple plan, of an iron revolving disk and diamond dust, which interested me much; the manufacture of ice, by two exhibitors, who deal out small cakes to a crowd of visitors, in the place of business cards; Jacquard looms, which weave small portraits of the Queen (also sold on the spot), &c., &c. The exhibition of steam engines and locomotives is very fine, and in excellence of workmanship is far superior to anything I have ever seen on our side of the Atlantic. One of the great marine engines, built for a monster iron-plated frigate, now in course of construction, is shown, so arranged in pieces that the visitor may inspect every portion, and, at the same time, see its relative connection with every other part. It is in such work as this that an American feels that the English have no superiors. There are no ornamental "fixins," but everything about these engines seems adapted for hard, continuous service. And I also remarked this, that machines of American invention, built in England, are better pieces of workmanship than their originals. An English mechanic seems to never use a piece of wood if he can make iron available, and although the first cost must be greater, the machine in the long run is probably cheaper. I was also much interested in an exhibition of samples of all the marine telegraphic cables (entire and in sections), laid down in various parts of the world, some of which have been eminently successful and others failures, and in "Bonelli's electric loom," "Bonelli's electric telegraph," by which an exact *fac simile* of any writing or drawing is transmitted, and in two practical adaptations of the electric light to lighthouse illumination, one English and the other French. In the first, the light was produced by revolving magnets, arranged on a wheel three feet in diameter, driven by a two-horse power engine. The light was very steady and brilliant, and the plan has now been in actual operation at the South Forelands lighthouse, under the direction of Prof. Faraday, for over a year. It would seem likely to be universally adopted. The French light was, for some cause, imperfect.

Of warlike implements there is no end, the British Government leading off in the display, and every European nation following except France which sends nothing in this line. The heavy guns exhibited by the British Government are all breech-loaders, mostly of the Armstrong pattern, and this breech-loading system characterizes all of the guns sent by the continental workshops except Spain, which, in common with France, has neglected it. The British guns are of splendid workmanship, and the 10-inch are more massive than the American 10-inch, but there is a complication about them which does not auger well for service. By the side of these guns lie portions of the iron targets which have been used by the government commission in experimenting with the Armstrong and Wentworth guns and very thoroughly have they been smashed and penetrated. As the range at which these results have been arrived at was small the inferences are of little value.

The display of jewelry, of work in the precious metals and in ivory carvings, enamels, &c., is probably the finest and most extensive the world has ever seen. Most curious in this line are the things carried off from the Chinese Emperor's summer palace at its sacking three years ago by the combined French and English armies. It was said that the English did not have their grab until the French were satisfied, and that the former obtained comparatively little. If this is so one naturally wonders after seeing the specimens of the English plunder what the French must have in their possession. Among the objects exhibited in the Exhibition from the palace, in addition to whole cases filled with miracles of ivory and wood carving, enameled vases, porcelains, silks, &c. there is a string or necklace of pearls, said to be the most perfect in the world. Each pearl is about the size a a small filbert, perfectly round and without the slightest imperfection, and all so nearly alike in size that the eye can distinguish no difference between them; their value, including a few diamonds at the ends of the necklace, is estimated at $50,000. There is also a cup, the bowl of which consists of half of a human skull, inlaid with diamonds and emeralds and mounted upon a massive and sculptured gold stand over a foot in hight. The costly screen which stood behind the throne is also here.

Across the nave fine specimens of the plunder of India are exhibited, including the great Koh-i-noor diamond and its two smaller companions, and the two largest rubies in the world. These last were taken during the recent war from the treasury of Lahore and were formerly worn by the Mogul Emperors. They are each about the size of a large walnut and form the pendents to a diamond necklace of about 20 stones, these latter being of the size of small filberts. In an adjoining case a French exhibitor shows the largest and finest sapphire in the world, measuring, I should say, 3 by 2¼ inches, and without a flaw. Elsewhere one may see the largest and finest known emerald, oriental amethyst, the supposed largest cats-eye and a pearl nearly an inch in diameter. The French also make a most curious exhibition of artificial gems and pearls. One exhibitor shows two sets of pearls, one real, worth £4,000 ($20,000) and another false, worth £40 ($200), and defies any person to distinguish, by sight alone, between the two. The false gems are exhibited in every stage of manufacture, from the mass of composition in the crucible to the cut and set stones. Here, again, the eye is completely at fault, the taste of the manufacturer leading him to discard all extravagances, the more completely to deceive. The price of these fictitious gems is however very high.

The display of porcelain and glassware is very extensive and wonderfully fine. The French Government sends from the Sevre works about 500 pieces, Dresden and Bohemia occupy a large space. One however, is little prepared for the show made in this department by the English manufacturers, who certainly equal, if they do not surpass, the finest French work. I am told that the advance made in porcelain and glass fabrication during the last ten years is greater than in any other branch of manufacture. What say you to an English dinner service, every plate of which is worth ten guineas ($50)? Or to a glass jug or vase, covered over with the most beautiful lace and cameo-like cutting, for £250 ($1,200). Most of these beautiful articles are marked sold, and this fact continually impresses you with the consciousness of the immense wealth which must exist in Great Britain, to enable such fabulous prices to be continually paid for objects which the slightest accident would render valueless, and which have little or no practical value. In the case of the glass vase or jug aforementioned, a sale was effected the very first day of the Exhibition, and the purchaser, who paid £250, was afterward offered £500 ($2,500) for his bargain and refused it.

You are aware that the present Exhibition, unlike the former one of 1851, includes a gallery of pictures, the finest art treasures of the kingdom having been freely lent by their possessors. Of the number of these I will only say that the walls of the various galleries are nearly 30 feet high (the pictures being hung four and five deep), and in their entire length measure over a mile. I have spent two entire days but did not get a fair sight of half of them.

D. A. W.

Rotary and Piston Steam Pump—Throwing Water.

Messrs. Editors—On page 134, current volume of the Scientific American there is a letter from Ottawa, C. W., in regard to streams thrown from rotary pumps. The writer's views are entirely different from my experience. I have had a great deal of experience with steam fire engines, both piston and rotary, and have repeatedly seen engines of the same build of boiler—the one with a rotary pump and the other with a piston pump—tried side by side with the same length of hose and diameter of nozzle, both having water and steam gages, and I have almost invariably found that with the same water pressure the rotary throws one quarter further than the other. On comparing pressures it will be found that up to about 40 lbs, of steam the rotary has the most water pressure; at 50 lbs. they are about equal, and at 60 lbs. the piston begins to go ahead. When the water pressure of the rotary arrives at 100 lbs. pressure, it seems to have about reached its limit. I have known one rotary, however, to get 140 lbs. water pressure on, but I have seen a piston pump run it up to 360 lbs.

There seems to be a limit to the useful pressure in throwing a stream of a given diameter. This seems to be for a one-inch stream about 70 lbs., and the distance 250 feet; for an inch and a quarter stream the pressure is not far from 160 lbs., and it can be thrown about 280 feet.

It takes much more pressure than is generally supposed to throw water through a long line of hose. To deliver 300 gallons per minute through 1,500 feet of hose, requires a pressure from 180 to 300 lbs., depending on the kind of hose and the manner in which it is laid.

M. B. B.

Toledo, Ohio, August 26, 1862.

To Preserve Peaches.

Messrs. Editors:—Procure glass jars with the Willoughby or Bodine & Brother's Patented Stopper, or any other simple and effective stopper, select good solid peaches, pare and take out the stones, take one pound of the parings, one pint of water, half a pound of white sugar, boil well together for forty minutes in a brass kettle, then strain through a cloth, let the sirup cool, fill the jars with the pared peaches, pour in the syrup until the jars are full. Take a convenient vessel, put a cloth in the bottom, set in the jars, then fill the vessel or the space around the jars with cold water, to come within three inches of the top of the jars, set on the stove, bring gradually to a boil, boil well for thirty minutes, take the jars out of the vessel, put on the stoppers, screw tight while hot. Peaches put up in this way will stay solid, and keep the natural color and flavor for any length of time.

M. Harbster.

Reading, Pa., August 28, 1862.

Big Guns.

Messrs. Editors:—The 22-inch gun at Constantinople, mentioned in your last number, is not the largest in the world. The forts at Dardanelles mount 28, varying in diameter of bore from 25 to 28 inches. They are brass, with chambers. (Morse's *Gazetteer*, article "Dardanelles.") "Queen Elizabeth's Pocket Pistol," at Dover, a long Dutch gun of the 15th century, is said to have thrown its 12-lb. ball seven miles, which the *Edinburgh Review*, April 1859, page 263, considered not improbable.

Marshall S. Bidwell, Jr.

Monterey, Mass., August 26, 1862.

Any substance in infinite division must of necessity be black, from its not having breadth enough to reflect a ray of light, which requires certain definite dimensions that philosophers have measured. Metals of all colors exhibit the same phenomenon; white silver, yellow gold and red copper may all be reduced from solutions in powder so fine that they are black.

IRON IN SHIPBUILDING.

The following from the last number of that profound publication, the *Edinburgh Review*, is not only interesting in a historical point of view, but is also scientifically instructive :—

Mr. Grantham has found, in a journal of the year 1787, an account of the arrival at Birmingham "of a canal-boat, built of iron by John Wilkinson, Esq., of Bradley Forge ;" and the writer then proceeds to describe the construction of the novel monster with as much care as the newspaper correspondent lately bestowed on the *Merrimac* and the *Monitor*. From this period, similar boats were frequently used in inland navigation ; and some of the earliest specimens, Mr. Grantham tells us, are still in existence—an incontestable proof of the durability of the materials. The first iron boat that was ever launched in salt water was a pleasure boat, built under the direction of Mr. Jevons, of Liverpool, in the year 1815 ; but it might have been long before iron was adopted as the material for ship building in good earnest, if, in the meantime, the art of propelling ships by steam had not been brought into practical operation.

A series of experiments instituted by the Forth and Clyde Canal Company in 1829-30, to ascertain the law of traction of light boats at high velocities on canals, led to the application of iron for the construction of vessels ; and the lightness of these new vessels, combined with their increased strength, suggested the extended application of the material in the construction of vessels of much larger dimensions.

Iron, it was perceived, was better suited than wood to resist the strain of the engine, and would allow more space for the stowage, which was inconveniently curtailed by the coals and the engine. It was not till long afterward that the employment of iron in the construction of a sailing vessel was attempted.

The first iron steamboat that ever put to sea, the *Aaron Manby*, was built by the manufacturer whose name she bore, "under a patent which was taken out in France for steamboats, in 1820. She was built at the Horsley works at Tipton, in Staffordshire, was sent to London in parts, and was put together in dock." In September 1821, Captain, afterward Sir Charles Napier, who seems to have been a partner in the speculation, "took charge of her, and navigated her from London direct to Le Havre, and from thence to Paris, without unloading any part of her cargo—she being the first and only vessel that for thirty years afterward sailed direct from London to Paris." It is farther worthy of note that "from 1822 to 1830 her hull never needed any repairs, though she had been repeatedly aground with her cargo on board."

The iron vessels that were successively built are enumerated by Mr. Grantham in chronological order, and to most of them belongs some circumstance of interest. The *Alburkah* a little vessel, built in 1831, by Mr. M'Gregor Laird for the African expedition which he conducted himself, drew only 3 feet 6 inches of water, and her success dispelled the prejudice which had previously existed as to the danger of going to sea with so light a draught of water. The *Garryowen*, built in 1834, was the first that exhibited a "regular arrangement of water tight bulk heads," an improvement the adoption of which has since been rendered compulsory by the legislature. The *Nemesis* and *Phlegethon*, built in 1839, whose names seem ominous of their future destiny, were the first iron steamers that were engaged in active warfare, and they took a conspicuous part in the Chinese expedition. But, in our opinion, the greatest interest which attaches to these and all the other vessels mentioned by Mr. Grantham is, that whereas the average duration of wooden ships is thirteen years, they are all afloat at this day, with the exception of the first, the *Aaron Manby*, and she was not broken up till the year 1855.

Notwithstanding this success, the advocacy of iron steamboats was but uphill work, Mr. Grantham tells us, in the year 1842, when he published his first work on the subject. The judgment of practical men was convinced of the superiority of iron, but the feeling of the public was still in favor of the old marine. From that date, however, iron vessels have rapidly increased, and for some years past no ocean going steamer has been built of wood. In his first work, Mr. Grantham gives an account of the construction of the *Great Britain*, which was then on the stocks, and which was, he says, at "that time, the boldest effort ever made in iron shipbuilding, and formed the most remarkable feature in the history of that important science." The resistance which the *Great Britain* offered to the beating of a violent surf, when stranded on the coast of Ireland, and the triumphant style in which she has kept the sea since, without receiving damage from the elements or needing repair from the injuries of time, have often been cited as proofs of the durability of iron vessels. To this Mr. Grantham adds many other instances, the most striking of which is that of the *Persia* :—

On her first voyage, in 1857, she was preceded by the *Pacific*, a timber-built steamer, and both seem to have fallen in unexpectedly with large floes of ice. The *Pacific* went down with her immense living freight; the *Persia*, encountering a small iceberg when at full speed, split it in two, and received no injury, except by the fragments which floated into the wheels, and broke several of the floats.

We rejoice that the *Great Eastern*, after her disastrous trial trip, and her subsequent misfortune in the great Atlantic storm, has redeemed her character by two successful voyages to and from the United States. Of no other material than iron could so gigantic a vessel have been constructed.

The first question is, what material will produce the best ship ; and the superiority of iron over wood, we think, is triumphantly established by experience in the eight points on which Mr. Grantham institutes a comparison, and which he arranges, though not perhaps in very natural or logical order, as follows :—1. Strength combined with lightness. 2. Capacity for stowage. This in large vessels is as 6 to 5 ; in smaller ones as 5 to 4, an advantage which may often make the difference between profit and no profit. 3. Safety in matters not immediately connected with strength, such as increased buoyancy, and comparative safety from fire. 4. Speed. 5. Durability. 6. Economy in repairs. It is calculated that in twelve years the repairs of a wooden vessel equal its prime cost. The ship carpenter, like the carriage builder, when he turns out his work secures to himself an annuity for years to come. But the iron shipwright must make his profit in the first instance. For about twelve years the iron boat ought to need no repairs at all ; and when needed at last, or rendered necessary by an accident, the reparation is unexpensive and easy. Painting, it is true, must be frequent. We entirely agree with Mr. Grantham, that painting is preferable to galvanizing, which imparts rigidity to iron and impairs its toughness. A commission has recently been appointed to inquire into the expediency of sheathing iron vessels with copper, and great use has been made of a patent metal invented by the late Mr. Muntz for the purpose. 7. Cost of construction, the saving effected by the use of iron being about 10 per cent. 8. Draught of water.

Mezzotinto Engraving.

This is a kind of engraving very different from common engraving upon steel. The common or line engraving as it is called, is done by the graver, the lines made by that instrument producing the figures by shade. Mezzotinto, on the other hand, produces the shades as it were by minute dots and the light by scraping away dotted parts of the steel plate. The first operation is to trace out with chalk the space for the picture on a smooth steel plate. The grounding tool is then employed to go over the whole face of the plate for the picture. This tool is formed with a curved face serrated like the finest rasp. It is held steadily in the hand pressed with a moderate force rocking it from end to end till it has completely hacked all the face of the plate. The other lines are then drawn across the plate at right angles to these and the rocking operation repeated. These diagonal operations have to be repeated a number of times until the part of the plate for the picture produces a very dark ground. The design is then traced on the plate, some artists employing one way some another, and the picture is finished by scraping away parts of the serrated surface for the light by a tool formed something like a burnisher. The masses of the strongest light are first begun and scraped pretty smooth, and some parts are burnished. The next lower graduations of shade are then scraped down after which the reflected lights are entered upon. Various proofs of the work are taken during the progression of the engraving.

This style of engraving is exceedingly soft and rich in tone, so much so indeed that it has been condemned by some as being too tame in character throughout.

It is difficult to tell who was the first discoverer of mezzotinto engraving. It was practiced on copper for a long time before it was tried on steel. Mr. Turner, an eminent London engraver, states in the Transactions of the Society for the Encouragement of the Arts, that James Watt was the first who suggested unto him the use of steel plates for the mezzotint. This was in 1812. No work of the kind however, was produced until 1821, and this was upon a steel plate softened by the process discovered by Mr. Perkins, the ingenious American engineer, then residing in London. In 1821 Mr. Turner engraved a portrait on one of Perkins's plates which met the approbation of Sir Thomas Lawrence, and in 1822 some splendid engravings were produced and prizes given by the society mentioned. Since that time the art has spread over the whole civilized world, embellishing our parlor periodicals and adorning our choicest annuals.

Indian Madar as a Substitute for Cotton.

The following interesting communication is from a correspondent of the London *Chemical News* :—

Amongst the various proposed substitutes for cotton, there is one which has not as yet attracted the attention of scientific men—the Indian madar plant. It is, nevertheless, admirably adapted for this purpose, as both the fiber, the floss, and juice can be employed for commercial purposes. In the year 1854 the prisoners of the Shahpore Native Gaol, Bengal, were employed in making mats and cloth from this plant, under the auspices of an officer who took great interest in the scientific resources of India.

The madar is a wild jungle plant, which grows to a considerable hight, flourishing in almost any soil. Its leaves are ovate, very dark green, and very thick, somewhat resembling those of the laurel. The juice could be used instead of gutta percha, over which it possesses a considerable advantage, as the madar plant retains its vitality after being repeatedly cut down to obtain the fluid. Moreover, the great abundance of the madar compared with the rareness of the gutta percha tree would tend to augment the value of the madar juice. This fluid is at first milk white, but changes, on exposure to the sun and air, to a dull brown, like india rubber. It could be applied to every commercial use hitherto obtained from gutta percha.

To proceed : As regards the use in which it could be substituted for cotton, if the stalks be soaked either in water or, still better, in weak alkaline lye, the fibers separate and can be carded like flax by the ordinary process. The natives simply separate the fibers with their teeth. These filaments are pale yellowish, like flax. They are very strong, as the natives of India use them for fishing lines in place of catgut.

Even supposing the application of the madar to be but partial, its cultivation, together with that of the cotton plant, might be carried on with great advantage. So far for the fiber. The floss of the madar strongly resembles unspun silk, being yellow covered and very soft. It can be spun in a manner exactly similar to silk, to which it is scarcely inferior in quality. I have also a small portion of the cloth of the madar fiber made in the native gaol at Shahpore, Bengal Presidency. From it I am inclined to judge favorably of the probable quality of the cloth, if manufactured with greater care. Moreover, besides the cloth made from the fiber or the floss separately, a very useful fabric could be formed of both mixed, the woof being made of the floss. In this form, perhaps, the madar plant would be most useful, as the floss contributes softness, and the fiber strength and firmness. Were these remarks to excite the interest of any scientific men, I should be happy to enlarge on them with any further information in my possession, or to show specimens to any gentleman who might take an interest in the matter, or wish to investigate the subject more fully.

TIN PIPES.—*Le Génie Industriel*, states that the manufacture of tin pipes in France is monopolised by M. E. Lapan, of Lille, who patented machinery in 1852 and 1853, by which the cost of the manufacture was greatly reduced.

Improved Ship's Rudder.

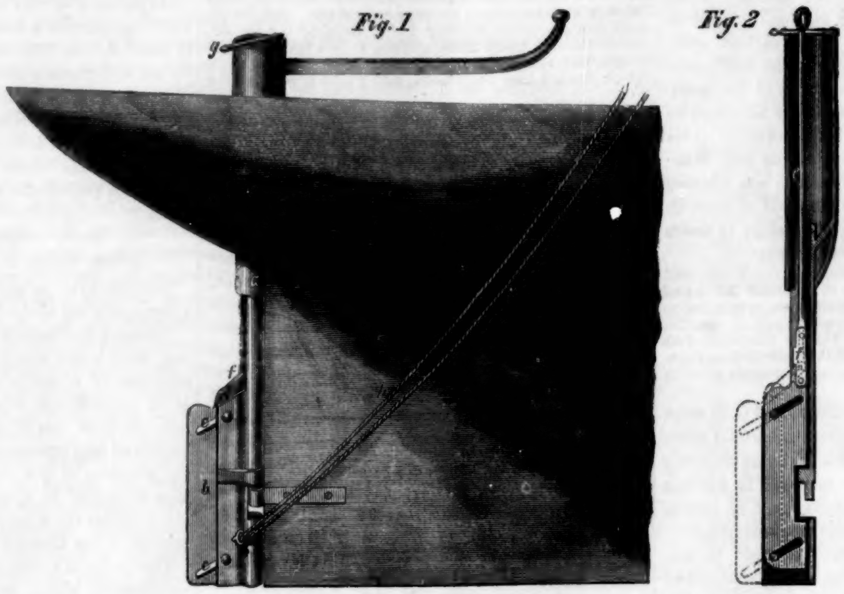
"Behold, we put bits in the horses' mouths, that they may obey us; and we turn about their whole body. Behold also the ships, which though they be so great, and are driven of fierce winds, yet are they turned about with a very small helm, whithersoever the governor listeth."

The vessels of which James wrote this were mere cockle boats compared with the huge fabrics of modern art, and yet the statement is as true when applied to the *Great Eastern* herself as to any smaller craft; as long as the rudder remains perfect the ship moves in obedience to her commander's will, as if she were a living thing; but if the rudder is broken the vessel at once becomes an unmanageable mass, drifting at the mercy of the winds and waves. There is not a more helpless situation in which a man can be placed than in the wide ocean upon a vessel which will not obey her helm. To overcome the appalling effects of this accident is the object of the invention here illustrated.

The simple plan adopted is to construct an expanding rudder which may be made so narrow that it will pass through the port of the rudder stock, and will then spread to sufficient width to guide the vessel. This rudder is formed of iron plate, the first piece, *a*, being bent into the form of a cylinder at the upper end, while the lower end is fashioned in two leaves which embrace a second plate, *b*. This plate has two inclined slots, *c c*, through which bolts pass loosely and are riveted to the embracing leaves. It will be seen that if the plate, *b*, is allowed to rest upon the bolts, it will slide outward, owing to the inclination of the slots, and will thus form a blade of sufficient width to guide the vessel. If, however, it is drawn up and suspended by the rod, *e*, (see section Fig. 2) the same inclination of the slots will draw it within the fold of the piece, *a*, in which position the rudder is sufficiently narrow to pass through the port of the rudder stock.

In order that the plate, *b*, may have this diagonal motion while the motion of the rod, *e*, is vertical, it is necessary to connect the two by a link, *f*, with joints at its ends. The bar, *g*, is provided for holding the rod, *e*, suspended while the rudder is being lowered, and cords, *h*, on both sides of the vessel guide the pintles into their places.

The patent for this invention was granted through the Scientific American Patent Agency, August 5, 1862, and further information in relation to it may be obtained by addressing the inventor, John C. Raymond, at Brooklyn (E. D.), N. Y.



RAYMOND'S JURY RUDDER.

Experiments with Petroleum at Liverpool.

As great quantities of American petroleum are now imported into Liverpool, a number of the merchants in that city made complaints to the Town Council that it was explosive, very dangerous, and should not be permitted to be stored in the dock warehouses. In order to obtain positive information respecting its explosive and inflammable character, the Liverpool Town Council lately made several interesting experiments. A temporary brick vault was erected upon an empty lot of ground and a small cask of Canadian petroleum was first placed in it and ignited, and after burning for a short period it was extinguished by one of Phillip's Fire Annihilators. A second cask was then ignited and allowed to burn for five minutes, and extinguished in the same manner. A third cask containing thirty-four gallons was ignited and the fire allowed to acquire considerable headway and intensity, when two streams of water through hose were brought to bear upon it, after a short period the flames were extinguished. A barrel of petroleum was then placed upon the open ground and ignited and when the fire had become intense, two streams of water were applied, but were found very ineffectual. A fire annihilator was then placed in the fire and it also failed to extinguish the flame. More copious streams of water however accomplished the object at last. A barrel of Pennsylvania petroleum standing upon end, was then ignited on the open ground. Its flames rose higher than those of the Canadian petroleum, and they were ultimately extinguished by powerful streams of water. Those who witnessed these experiments were surprised that none of the barrels exploded, for they had expected such a result. Petroleum is not explosive, but its vapor mixed with atmospheric air is. The very inflammable nature of the petroleum however led the Town Council of Liverpool to conclude that it should not be stored adjacent to warehouses, or on docks containing common merchandise.

RICE'S SHAFT COUPLING FOR CARRIAGES.

Our carriage makers have long been striving to construct pleasure carriages that would run without any rattle or jingle, and they have succeeded in the

effort to a surprising extent; but there are still a few parts which will rattle somewhat as soon as they become a little worn. One of these is the joint by which the shafts are secured to the front axle, and the annexed cut illustrates an invention deigned to overcome the difficulty at this point.

Fig. 1, is a perspective view of the coupling, and Fig. 2, a longitudinal section. The strap, A, is bent around the axle, and between its two ears, *b b*, the iron rod, C, is fitted; this rod being fastened to the end of the shaft. A steel bolt, D, holds the two parts together, and this invention consists in a plan for preventing any rattle by this bolt or its connections. For this purpose a brass bushing, E, Fig. 3, is introduced into the hole in the rod, C, and is pressed backward against the bolt by a block, F, of india rubber, as shown in Fig. 2. The elasticity of the india rubber will press the brass bushing against the bolt, and will prevent any rattle; thus perfecting the last improvement necessary to the production of a noiseless carriage.

This design is the invention of Benjamin Rice, of Hastings on the Hudson, N Y; and one half the invention has been assigned to Wm. Lamb, who may be addressed for further information in relation to the matter, at Yonkers, N. Y.

PNEUMATIC DISPATCH COMPANY.—A meeting of the company organized for carrying dispatches and parcels through the exhaust tube, illustrated on page 209, Vol. V. (new series), SCIENTIFIC AMERICAN, was lately held in London, with a view to increase the capital of the association. It was proposed to extend the works and obtain new machinery at a cost of about $650,000. A resolution was passed to increase the capital $250,000 by issuing shares of $50 each. Several members present at the meeting opposed the motion. Mr. Preston, one of these, stated that, in his opinion, the system was a financial failure, and he thought it should be abandoned. The majority of the members, however, were of a different opinion.

Krupp's Steel Castings.

The works of H. Krupp, at Essen, Prussia, have obtained a world-wide celebrity for the production of the most massive and perfect steel castings. Krupp's display in the London Exhibition has astonished and puzzled the English workers in steel. He exhibits a cast-steel cylinder which weighs twenty-one tuns, and it has been broken across to show its grain. Not a single flaw has been detected in it under the scrutiny of a magnifying glass. Steel shafts, rolls, railway tyres and wheels are also exhibited; also a steel cannon of 8-inch caliber. The processes by which such perfect steel castings are obtained has been kept somewhat secret.

The superiority of Krupp's castings is perhaps chiefly due to the perfection of the mechanism used and the mode of conducting the operations. The smelting crucibles contain 70 lbs. of steel each, and when a large casting is required the organization has been carried to such a degree of perfection that at a given signal all the crucibles are ready to be lifted at the same time and poured into a large receiver, whence the steel flows to the mold. In bronze casting on a large scale homogeneity of the alloy is obtained in the same manner.

The London *Engineer* states that Krupp's apparatus for making steel is the most gigantic in the world. He has a steam hammer which weighs 50 tuns, and an anvil that weighs 192 tuns, resting on eight blocks of cast iron, each weighing 135 tuns. The mold for a large steel casting is always made so as to avoid angles. It has been stated that puddled steel made with a mixture of German zinc cast-iron, similar to Franklinite, is employed for these purposes.

AMERICAN MANUFACTURES.—The London *Illustrated News*, of August 2d, says:—"The only exhibitors at the International Exhibition of cotton goods from the United States are Messrs. G. Brewer & Co., of Boston. The goods shown are a superior quality of fine shirtings, which were certainly not produced a few years ago in any part of the United States. These goods arrived very late, and have not been included in the awards of the jury, which they certainly ought to have been if in time for examination."

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VOL. VII. NO. 11.....[NEW SERIES.]....*Eighteenth Year.*

NEW YORK, SATURDAY, SEPTEMBER 13, 1862.

EXPERIENCE WITH STEAM FIRE ENGINES.

It is now generally conceded that steam fire-engines, as compared with hand fire engines, are the most efficient and desirable in two features. One consists in the constant and reliable operation of the steam moter. Its iron sinews never grow weary like those of the human arm which move the hand engine. It also possesses greater power than the hand engine for throwing water to higher elevations, such as the roofs of lofty buildings. These are important advantages; but on the other hand, it has been urged against them that their first cost is greater, and being heavier than the old engines they cannot be drawn so rapidly to fires nor set to work so quickly. And to crown all, it has been asserted that as they have so many movable parts they are very liable to get broken, or become deranged when drawn over rough streets and when working, and thus they are extravagantly expensive to keep in order. We have heard it asserted that these assumed defects of steam fire engines counterbalance all their admitted advantages. It is only by practical experience that reliable information can be obtained respecting the comparative advantages and disadvantages of any two systems, like those of hand and steam engines for extinguishing fires. Heretofore full information on such a subject has been most difficult to obtain, but we have now received it in the annual report of the Board of Fire Commissioners for the City of Troy, N. Y., by Samuel K. Briggs, Esq., President of the Fire Department.

Three steam fire engines have been purchased and used, and have been found more efficient than seven hand engines, and the report says: "There is every reason to believe that when the present department shall have been thoroughly organized its yearly cost will be little, if any, above half of that system which it supersedes." The citizens of Troy feel so much greater security from the steam than the old engines, that the report says: "If the present security from fire was purchased at a larger annual outlay, it is believed the tax-payers would willingly submit to an increased burden in view of the advantages thus secured." Of the three steam fire engines used in Troy one called the "Hugh Rankin," built at the Amoskeag works, Manchester, N. H., has done wonders, and a very full report of its performances is given. Its entire cost with horses and all complete, was $3,562. It had been eighty-five times at work, and from September, 1860, till February, 1862, it had operated one hundred and sixteen hours, thus affording ample opportunities to test its qualities. In one instance, from the time the bell struck the alarm until the "Hugh Rankin" had a stream on the fire through one thousand feet of hose it was only seven minutes. On another occasion, during a conflagration in Schenectady, in answer to a telegraph dispatch for this engine, it was placed upon a platform car, conveyed a distance of twenty-one miles by railroad, dragged by hand over one third of a mile, and had a stream of water on the fire in fifty minutes from the period the message for it was sent. No hand engine could have been more promptly brought into action upon these fires. With respect to durability the report says: "This engine never missed fire by being disabled or compelled to stop and return home when on trial, or doing fire duty by any disability." And during the whole period of its use it has only cost $31.50 for repairs. It has an upright tubular boiler with a fire surface of one hundred and fifty-two square feet. The pump is a double-acting piston cylinder four and three-quarter inches in diameter and twelve inches stroke, placed directly under the steam cylinder which is eight inches in diameter and the same stroke as the pump. Its weight with engineer, driver and fuel on board is 5,600 pounds. Those citizens in Troy most interested in procuring this light engine obtained it to demonstrate to the public that steam fire engines could be put to work as quickly as hand engines, and that they were as efficient at small fires. It was also obtained to show that such an engine was perfectly practical and economical to use in a city where many of the streets are very rough and hilly. It has been completely successful and has cost much less for repairs than a hand engine would have done in performing much less work. The first steam fire engines which were built for our cities were rather large, clumsy and heavy. They are now being superseded by a class of lighter and more compact engines, which have proven themselves to be so efficient that insurance companies may profitably reduce the rates which they formerly charged under the old hand engine system.

OPINIONS ABOUT ARMOR-CLAD WAR SHIPS.

We lately (on pages 134 and 135, present Vol. SCIENTIFIC AMERICAN) published an interesting lecture of J. Scott Russell on iron-clad ships. This distinguished engineer has also published a pamphlet in London on the building of armor ships, which has called out a considerable amount of criticism, and provoked some animated controversy. He has attacked the British Admiralty for incapacity in expending twelve million pounds ($60,000,000), within the past three years in producing only two efficient frigates, the *Warrior* and *Black Prince*, and expending the rest on two armor "tubs," the *Defense* and *Resistance*, and in changing several wooden frigates to armor clads, like the American *Roanoke*. Mr. E. J. Reed, a naval architect employed by the Admiralty to rebuild the combined wood and armor frigates, forming them out of staunch old wooden ships, defends his own system, and attacks that of Scott Russell; the London *Times* being the arena of this wordy conflict.

A large frigate of the *Warrior* type, with a strong iron frame, thick plating, wooden lining, a fine model and powerful engines, seems to realize Mr. Russell's ideas of a perfect armor-clad war vessel, and he consequently condemns all other types. Respecting the *Warrior*, the London *Mechanics' Magazine* says:—"it is unprotected at both ends, and might be disabled by a very few broadsides; she steers and rolls awfully, leaks through the joints of her armor like a sieve, and worst of all, she is armor plated in so defective a manner, that by the admission of the First Lord of the Admiralty, and from the results of experiments at Shoeburyness, the through bolts which form the fastenings are liable to be destroyed by a few discharges of shot, and the plates to fall bodily off the side of the ship." These are serious charges against the construction of this frigate.

The London *Engineer* describes its favorite iron frigate as follows:—"She wants a long sharp iron hull, alike at each end, and capable of turning upon her center, with two heavy guns at each end, pointing fore and aft, with an accurate range of ten miles. The vessel should in truth, be as stock to the guns to enable them to move at a speed of twenty miles per hour. The vessel should be all steam and gun, and throw a shot of from three to five hundred weight without any recoil whatever. She should choose her own distance, and present no mark save a sharp point to the enemy, and she could meanwhile strike his broadside." This is entirely an ideal vessel. The best known cannon are very unreliable at ranges exceeding twelve hundred yards. It is futile therefore to speak of guns at present having an accurate range of ten miles—seventeen thousand five hundred yards. The American Naval Department wisely resolved, we think, on the building of several classes of armor vessels, and several sizes of some of these vessels. The *Ironsides* is of the *Warrior* type, the *Roanoke* of a different class, and the turret class is entirely different from either of these. In the present state of iron-clad shipbuilding, it is very indiscreet for any scientific or practical man to be dogmatic in his opinions in favor of any one, and against all other classes of armor vessels. This is almost a new art; and knowledge on the subject is so limited, that it becomes all men to be very modest in expressing opinions respecting such vessels. One conclusion, however, appears to be inevitable, if reliance is to be placed in the statements respecting the thick plates of the *Warrior* falling off by the through bolts being broken; namely, that several layers of thin plates with intermediate fastenings, as well as through bolting must be superior to the use of single thick plates. This will permit such vessels to be armor-clad at much less expense; and at the same time it substantiates the superiority of forming the turrets and sides of Ericsson's *Monitors*, with layers of one-inch plates. The commission appointed by the British Government, however, to test plates of various thicknesses, have condemned the use of these plates, and the *Naval Gazette* says on this head: "The American plan of bolting thin plates together, adopted in ignorance of statical laws, is altogether condemned." No accounts of experiments are given to support this scientific dictum. An efficient iron-clad fleet, must comprise vessels of different classes and sizes for different services as has always been the case with wooden fleets, but much experience is yet wanted in determining the best forms, materials and modes of constructing armor-clad vessels.

DYNAMICAL THEORY OF HEAT.

We lately published the interesting lecture of Professor Tyndall, F. R. S., on "Force and the Laws of Motion," in which he described the dynamical theory of heat, which consists in considering heat an action or motion in bodies in contradistinction to considering it a subtle fluid; the latter notion being once entertained by many physicists. In the concluding part of that lecture—page 132, current volume SCIENTIFIC AMERICAN—the honor is awarded to Dr. Mayer for having first propounded and demonstrated the dynamic theory. To these statements Mr. Joule, F. R. S., has replied in a letter published in the *Philosophical Magazine and Journal*, taking some exceptions to Professor's Tyndall's remarks. He says: "Mr. Mayer's merit consists in having announced, apparently without knowledge of what had been done before, the true theory of heat. This is no small merit, and I am the last person who would wish to detract from it. But to give to Mayer, or indeed to any single individual, the undivided praise of propounding the dynamical theory of heat is manifestly unjust to the numerous contributors to that great step in physical science. Two centuries ago Locke said that 'heat is a very brisk agitation of the insensible parts of the object, which produces in us that sensation from whence we denominate the object hot; so that what in our sensation is heat, in the object is nothing but motion.' In 1798, Count Rumford, inquiring into the source of heat developed in the boring of cannon, said, 'it was very difficult, if not quite impossible, to form any distinct idea of anything being excited and communicated in the manner the heat was excited and communicated in these experiments, except it be motion.' In 1812, Davy said: 'The immediate cause of the phenomena of heat then, is motion, and the laws of its communication are precisely the same as the laws of the communication of motion,' and he confirmed his views by that original and interesting experiment, the melting of ice by friction. 'In 1839, Seguin published a work wherein he shows that the natural theory of heat generally adopted would lead to the absurd conclusion that a finite quantity of heat can produce an indefinite quantity of mechanical action.' From the above extracts it will be seen that a great advance had been made before Mayer wrote his paper in 1842. . . . . . . The dynamical theory of heat was certainly not established by Seguin and Mayer. To do this required experiment, and I therefore assert my right to the position which has generally been accredited to me by my fellow physicists, as having been the first to give decisive proof of the correctness of this theory. In saying this I do not wish to claim any monopoly of merit. Even if Rumford, Mayer and Seguin had never produced their works, justice would still compel me to share with Thomson, Rankine, Helmholtz, Holtzman, Clausius and others whose labors have

given developments of the dynamical theory which entitle them to merit, and who have contributed most essentially in supporting it by new proofs. In 1843, I applied the dynamical theory of heat to vital processes, and in 1847, in a lecture, explained the phenomena of shooting stars, and also stated that the effect of the earth falling into the sun would be to increase the temperature of that luminary. Since that time Thomson by his profound investigations, has made the dynamical theory of heat, as applied to cosmical phenomena, his own."

To Mr. Joule belongs the chief credit of proving by experiment the law which had previously been a subject of speculative theory, that not only heat and motive power but all other kinds of physical energy, such as chemical action, electricity and magnetism, are convertible and equivalent. Any one of those kinds of energy may, by its expenditure, be made the means of developing any other in definite proportions. Thus, the energy of the steam engine in driving a Beardslees' magneto-electric machine, is converted into currents of electricity, the force of which decomposes water and disintegrates metallic plates. M. Joule by experiments on the friction of water, oil, mercury, air and other substances, determined that the mechanical equivalent of a unit of heat is 772 foot-pounds, and it has been called "Joule's equivalent." The law of thermodynamics is that heat and mechanical energy are mutually convertible, and heat requires for its production and produces by its disappearance, mechanical energy in the proportion of 772 foot-pounds for each unit of heat. This unit is the amount of heat required to raise the temperature of one pound of water by one degree of Fahrenheit. In other words, the work or energy of raising 772 pounds one foot, or 1 pound 772 feet, expended in friction upon 1 pound of water will raise its temperature 1° Fah.; this is a unit of heat. The remarks of Mr. Joule accord with the views published on page 37, Vol. XII. (1856) old series SCIENTIFIC AMERICAN, in answer to an article in the London *Engineer* on the dynamical theory of heat.

BALLOON ASCENT FOR SCIENTIFIC PURPOSES.

On the 17th ultimo an ascent was made at Wolverhampton, England, being the second aerial voyage since March last at the same place for scientific purposes. The ascents were made by an appointed Committee of the British Association for the Advancement of Science, for the purpose of making various observations on the humidity of the atmosphere with philosophical instruments. The balloon used was of American oil cloth and contained 90,000 cubic feet of gas, the specific gravity of which was 330 compared with the the air at 1,000. Messrs. Glaisher and Coxwell were the balloonists, and the former has published a record of the ascent which only occupied about three hours.

When the ascent was made the barometer registered 29.50 and the temperature stood at 55°. In four minutes the voyagers found the temperature to be 45°, the air being dry. The temperature afterward so rapidly decreased that at two minutes after ten, when the sun was shining brilliantly on the balloon, the thermometer stood at 26°. Mr. Glaisher remarks that about this time the balloon being supposed to have attained a hight of about two miles they heard a band of music, and looking downward obtained a picturesque view of the earth. The fields looked like a tesselated pavement, possessing a combination of beautiful colors, and the roads were as clearly defined as though the observers had been but a little hight over them. The next change observed was an increase in the temperature to 31°, and at a quarter past ten the mercury had risen to 37°. On starting Mr. Coxwell's pulse was beating at 75 and Mr. Glaisher's at 76; but at this time Mr. Coxwell's had risen to 86 and Mr. Glaisher's to nearly 100. The gas, too, which had been opaque became perfectly transparent, and the neck being open Mr. Glaisher could see through the gas to the top of the balloon. Its proportions were observed to be accurate, and the netting clung tightly around it. A striking change was observed in the surrounding scenery. The sky, instead of being pale light blue in color was now an intensely deep Prussian blue. The cumuli clouds far below were very rocky in appearance, and the sun was shining upon their surface. The temperature, which had continued slowly to increase, was 38 at 10.30. Now the barometer was reading less than 15 inches, showing that the aëronauts were nearly four miles high. The palpitation of the heart was very perceptible, so much so that each man could hear the beating in the breast of the other. The ticking, too, of Mr. Glaisher's watch was remarkably loud, reverberating like a chronometer beating upon a sounding board, and the rustling caused by turning over the leaves of his note book appeared like the rushing of a high wind. At 10.35 the temperature had increased to 42°, and they had attained a hight of quite four miles. The air was very dry. A peculiar feature was at this time remarked: the hands were dark blue and the lips also blue, but not the face, the circumstance being accounted for by the atmosphere containing but a small amount of oxygen. Now the temperature began to decrease with wonderful rapidity. In four minutes it was reduced to 36°, and by 10.47 it was down to 31°. At 11.1, the highest elevation was reached, the barometer a little above 11 inches, and it was evident that the voyagers had ascended to very nearly five miles. Here the temperature was 16° or just as many degrees below the freezing point, and the breathing, which was observed to be interfered with when heart palpitation commenced, again became affected. Mr. Glaisher had been warned that at this hight blood would issue from the nose, that the eyes would be affected and there would be a tingling in the ears, but neither in the case of Mr. Coxwell nor in his own case were either of these manifestations perceived. Mr. Coxwell only found it necessary to put on one additional coat while they were up, and Mr. Glaisher wrapped a cloak round him but soon threw it off. The fingers were not benumbed, nor were either of the voyagers uncomfortably cold. The air was dry throughout the journey. At the highest elevation it was 18° below the freezing point. No dew was deposited. The dry bulb thermometer read 16° and the wet bulb 9°. Regnault's hygrometer at zero exhibited no dew, nor had Daniel's hygrometer any dew at 8° below zero. No dew could be deposited at this elevation at either of the hygrometers. The descent was made at 11.42. A. M.

VALUABLE RECEIPTS.

TO KEEP SILK.—Silk articles should not be kept folded in white paper, as the chloride of lime used in bleaching the paper will probably impair the color of the silk. Brown or blue paper is better; the yellowish smooth indian paper is best of all. Silk intended for dress should not be kept long in the house before it is made up, as lying in the folds will have a tendency to impair its durability by causing it to cut or split, particularly if the silk has been thickened by gum. Thread lace veils are very easily cut; satin and velvet being soft are not easily cut, but dresses of velvet should not be laid by with any weight above them. If the nap of thin velvet is laid down it is not possible to raise it up again. Hard silk should never be wrinkled, because the thread is easily broken in the crease, and it never can be rectified. The way to take the wrinkles out of silk scarfs or handkerchiefs is to moisten the surface evenly with a sponge and some weak glue, and then pin the silk with toilet pins around the selveges on a mattress or feather bed, taking pains to draw out the silk as tight as possible. When dry the wrinkles will have disappeared. The reason of this is obvious to every person. It is a nice job to dress light colored silk, and few should try it. Some silk articles may be moistened with weak glue or gum water and the wrinkles ironed out on the wrong side by a hot flat-iron.

WATER MELON RIND PRESERVES.—When the rind becomes a little transparent in salt brine, put it into fresh water for a day and night, changing the water several times, then boil it for one hour very fast in fresh water, cover with grape leaves to green them. Take them up and drop in cold water, enough to cool them quickly, then weigh, and to each pound of rind add two pounds of sugar and boil it rapidly with a few pieces of ginger. When done they are very transparent; add, when cold, a few drops of essence of lemon.

TO MAKE CARMINE.—Boil 1 pound 4 ounces of ground cochineal and a very little of the carbonate of soda in 4 gallons of soft water for 20 minutes; then take it from the fire and add 6 drachms of alum, and stir the mixture for a few minutes and let it stand for a quarter of an hour for the dregs to subside, then run off the clear liquor, strain the sediment through a fine sieve or cloth, and then when cold add the white of two eggs with the sediment, fish glue or isinglass will answer as well as the eggs. The muriate of tin may be used instead of alum. The weight of the cochineal may be reduced to any amount to make a small quantity if the proportions are preserved.

PREVENTING THE FRACTURE OF GLASS CHIMNEYS.—The glass chimneys which are now in such extensive use, not only for oil lamps, but also for the burners of oil and coal gas, very frequently break, and not only expose to danger those who are near them, but occasion very great expense and inconvenience, particularly to those who are resident in the country. The breaking of these glasses very often arises from knots in the glass where it is less perfectly annealed, and also from an inequality of thickness at their lower end, which prevents them from expanding uniformly by heat. The evil arising from inequality of thickness may be cured by making a cut with a diamond in the bottom of the tube

MARINE GLUE.—Dissolve 4 parts of india rubber in 34 parts of coal tar naphtha—aiding the solution with heat and agitation. The solution is then thick as cream, and it should be added to 64 parts of powdered shell-lac, which must be heated in the mixture till all is dissolved. While the mixture is hot it is poured on plates of metal in sheets like leather. It can be kept in that state, and when it is required to be used it is put into a pot and heated till it is soft and then applied with a brush to the surfaces to be joined. Two pieces of wood joined with this cement can scarcely be sundered—it is about as easy to break the wood as the joint.

CEMENT FOR MENDING STEAM BOILERS.—Mix two parts of finely powdered litharge with one part of very fine sand, and one part of quicklime which has been allowed to slack spontaneously by exposure to the air. This mixture may be kept for any length of time without injury. In using it a portion is mixed into paste with linseed oil, or still better, boiled linseed oil. In this state it must be quickly applied as it soon becomes hard.

Steamer Adriatic.

The *Adriatic* (the hull of which was built by the late George Steers, and the engines at the Novelty Works,) lately made a trial trip at Southampton, England, in presence of the Government authorities. She now belongs to the Atlantic Royal Mail Company, and was lately repaired and altered. She attained a speed of 16 statute miles per hour, with steam pressure of 24 lbs. on the inch. Her draft of water was 13½ feet forward, and 20 feet aft. She had 850 tuns of coal, and 55 tuns of water on board. Her engines made 15 tuns per minute, and the vacuum in the condenser was 29 inches. The *Adriatic* is 354 feet in length; 50 feet in breadth; tunnage 3,700 tuns; nominal horse power of engines 1,300; cylinder 100½ in diameter; stroke of piston 12 feet; diameter of paddle wheel 41 feet.

American Exports.

The following is a table of the value of American exports for the three years ending June 30, 1862. It is made up from returns of the Treasury Department:—

	1859.	1860.	1861.
Products of the Sea	$4,432,974	$4,156,480	$4,451,519
Products of the Forest	14,489,406	1,783,550	10,260,805
Of Animals	15,549,817	20,215,226	24,035,100
Vegetable Food	24,046,752	27,590,298	74,191,993
Cotton	161,434,923	191,806,555	34,051,583
Tobacco	21,074,038	15,906,547	13,784,700
Flaxseed	8,177	3,810	49,609
Cloverseed	596,781	696,919	1,063,141
Hemp	9,279	9,531	8,608
Brown Sugar	196,935	103,244	301,329
Hops	57,016	32,866	2,006,053
Manufactures	33,853,660	39,544,398	35,786,804
Coal	653,536	740,783	577,836
Ice	164,561	183,134	172,263
Quicksilver	—	258,682	631,455
Gold and Silver bullion	53,329,863	39,913,178	10,488,890
Raw Produce not specified	1,858,205	1,355,301	2,794,046

THE FLAXSEED CROP.—In reference to the new crop of flaxseed the Cincinnati *Price Current* says: A good deal of inquiry has been made of us regarding flaxseed. The crop is a large one and has been saved in good order. The yield is fully twenty per cent greater than that of last year. The contract system controls the great bulk of the crop, however, so that the price is an arbitrary one and indicates nothing. The crushers furnish the seed to the farmers on condition that they sell them the crop at one dollar per bushel, and hence this is the price the farmer now gets.

MISCELLANEOUS SUMMARY.

THE GREAT EASTERN.—This vessel arrived at her destination near Harlem in Long Island Sound on the 27th ult., with about 1,400 passengers and a general cargo. When passing Montauk Point she struck a sharp sunken rock, which opened a leak through which the water entered so fast that the pumps were unable to keep it down. Being divided into several water-tight compartments by bulk heads, only one has been filled by the leak. Her bottom has been examined and will be repaired before she proceeds on her return voyage. The damage is but slight, none of the goods were injured.

THE American paddle wheel steamer *Cortez*, was burned at Shanghae, China, on the 16th of July last; she had a full cargo on board most of which was consumed. The *Cortez* was a vessel of 1,117 tuns register, built for Commodore Vanderbilt in 1852, by J. Westervelt of this city. Her engines were of the following dimensions—cylinders, 42 inches, stroke, 10 feet. She formerly ran between Panama and San Francisco, and made the swiftest passage on record between California and China.

THE largest cannon in England is one manufactured at the Mersey Steel Works, Liverpool. It has a bore of 13 inches diameter, and it weighs 24 tuns, exclusive of the carriage. It throws a solid shot of 270 lbs. It is two inches less in caliber than the new navy Dahlgrens, that are intended for the armament of the new iron-clad gunboats. The big English gun is soon to be tested at Shoeburyness in firing against iron targets.

MONUMENT TO CROMPTON.—A statue is about to be erected as a memorial to Samuel Crompton in a public square of Bolton, England. Samuel Crompton, a hand-loom weaver, was the inventor of the mule spinning frame, which is a most ingenious cross between the old jenny and the throstle drawing frame of Arkwright. Crompton was one of the most modest and ingenious of English inventors. The finest yarns are spun on the mule frame.

THE ISTHMUS OF SUEZ CANAL.—We find in *Le Credit Minier* an account of the present state of the great work which is designed to connect the waters of the Mediterranean with those of the Red Sea. Fourteen dredges are employed in deepening a channel across Lake Menzalek, drawing up the mud and forming an embankment on each side six feet high. It is thought that the whole canal, from one sea to the other, will be completed in 1863.

A FOSSIL MAN.—The *La Salle Press* states that in Macoupin county, Ill., the bones of a man were recently found on a coal bed capped with two feet of slate rock ninety feet below the surface of the earth, before the run cut any part away. The bones when found were covered with a crust or coating of hard, glossy matter as black as coal itself, but when scraped away left the bones white and natural.

WHEN the application of coal gas to the lighting of streets was first suggested, Sir Walter Scott said, "It can't be done; it's only the dream of a lunatic." And Sir Humphrey Davy on being told that the time would come when all London would be lighted with gas, said, "It is all nonsense; you might as well talk of lighting London with a slice of the moon, as to talk of lighting London with gas."

IN THE late military procession in Boston, a plate for the frigate *Roanoke* made at the forge of the Pembroke Co., South Boston, was carried. It was 10½ feet long, 24 inches wide and 4½ thick, and weighed 4,300 lbs.

PARIS, as well as London, has commenced the construction of subterranean railways, for the conveyance of people from one part of the city to the other. The first road, from Montmartre to the Louvre, is just completed.

HOLLOW metallic canes filled with condensed gas are now used in some of the European cities. The bearer has only to turn a small nipple and apply his match, when he instantly finds himself furnished with a torch that will light him several hours.

WEALTH OF OHIO.—The Cincinnati *Gazette* says that the surplus product of Ohio for this year will exceed the interest on one thousand millions of dollars, and will exceed the interest on the National debt made by the war, in the year from its commencement.

Our Railways and Crops.

The *Railroad Journal* says:—It is now all but certain that the enormous business in the transportation of breadstuffs, provisions, cattle, &c., thrown upon our leading railroads the past and present year, will continue for twelve months longer. The crops already gathered or approaching maturity promise to be quite as abundant as those of 1861; while the demands of Western Europe will be little if any less. It is seldom indeed that for two or three consecutive years we find an unusually large surplus at home, connected with a correspondingly small production in other countries; the present, however, is one of those rare occasions which show the dependence of nation upon nation as truly as of every man upon his fellow.

From the great West we have glowing accounts about the crops. Ohio alone, it is estimated, will produce 30,000,000 bushels of grain, of which 17,000,000 will be a surplus for exportation. Should the people of the whole Northwest have raised as much of "the staff of life," man for man, as those of Ohio, the total yield of grain would not fall short of 107,000,000 bushels, of which 60,000,000 would be exportable. This would leave Kentucky and Tennessee out of account altogether, and give only one-half the estimate for Missouri.

Without placing too much reliance, however, upon mere estimates, we may accept as true the reports which come up from every quarter. The crops will as a whole be heavier than those of 1861, the yield of corn probably exceeding anything of the sort ever produced in the country. At the same time we find ourselves with still a very large surplus on hand from last year—a surplus that all the avenues yet opened are unable to carry off to the East. Since the first of January the two rival cities of Chicago and Milwaukee have shipped over 19,000,000 bushels or its equivalent, in nearly equal amounts from each. This, for a period of little over six months, exceeded anything ever before witnessed in the history of either city.

The effect of this foreign demand upon the prosperity of our leading railroads must be marked. The Central, the Erie, and the Pennsylvania never before transacted so large an amount of business as last year, in spite of the war. The last named earned $1,300,000 more than in 1860, and we hear that the earnings of the Erie will reach about $7,300,000 during the present year. Those of the Central are put at over nine millions by current report. It is evident, however, that tributary lines will share largely in this continued prosperity. The business of the Illinois Central may still suffer slightly from the closing of the Mississippi, yet the failing off in receipts last year, in spite of that sad occurrence, was very slight. The three great lines crossing the peninsula of Michigan, the Cleveland and Toledo, the Wabash Valley and its feeders, the Cleveland, Columbus and Cincinnati, the Bellefontaine—in fact, all the lines traversing the great Northwest and pointing in the direction of this city, Boston, Philadelphia and Baltimore—all find their hands full. With diminished expenditures in nearly every case, two such years of prosperity ought to take our railroad interests out of the slough and make most of the stocks in them remunerative.

Hemlock Tanned Leather.

The Hon. Zadoc Pratt gives some of his experience in the *Shoe and Leather Reporter* on tanning hides. From the records of tanning 200,000 sides, the average time required in tanning them was 5 months and 27 days. He says: The average weight of the leather was over eighteen and one-half pounds per side, and the average gain of weight seventy per cent for the whole time. This, according to the best authorities we have at hand, is considerably below the time employed in England. There it is no uncommon thing for eight and ten months to be employed in tanning a stock of sole leather, and some of the heaviest, it is said, requires from fourteen to eighteen months. Such deliberation undoubtedly insures fine quality, but it may be questioned whether there is not a great loss in the increase of weight, a loss of interest on capital, and in consequence an unnecessary enhancement of price, which does not suit the American genius or market. It will be borne in mind that they pay three or four times as much for bark as we do in this country. They have no hemlock bark. Hemlock is truly an American bark, and that of the Catskills affords more tannin and is better adapted to make sole leather than any other. The farther you go from the Catskill mountains the less tannin you find in the hemlock.

I do admire its cooling shade,
'Tis pleasant unto me—
Of all the trees the Lord hath made,
I love the hemlock tree.

When we sent the first hemlock leather to England John Bull's chemists said it was not tanned, and declared that they could bring it back to hide. The mistake was perhaps a natural one, but it was none the less a mistake; for after trying their utmost skill upon it they were obliged to exclaim that they did not know what those Yankees' red tannin had been doing to it. And so learned British chemists gave it up.

The hemlock is not rossed like oak before it is used. In all new countries bark is cheaper than in old, and less care taken to preserve it. It is often that they find it for their interest to use, where bark is dear, nut galls, terra japonica and divi divi, while in this country these are rarely used for sole leather, but sometimes to finish light stock, skins, &c. I have been engaged about fifty years in hemlock tanning, and a part of the time have added the use of oak to one tannery. The bark has scarcely ever been analyzed for the use of the tanner, and to my knowledge not at all since chemistry has been improved; the knowledge which I have acquired has been the result of long-continued practice and experience. This teaches me that the hemlock is much stronger than the oak. I have visited the English and the French tanneries but have seen nothing to compare with the American improvements.

Breech-Loading Fire Arms.

One of the simplest and cheapest modes of construction, now rapidly coming into use, consists in having the lock and all its operating parts arranged within the movable breech piece. Certain parties, however, claim to hold a patent upon the broad idea of such an arrangement, and, we are informed, are in the habit of writing letters to every person who patents or undertakes to use any device which involves the above principle of construction, warning them to discontinue the manufacture, and demanding pay for arms already made.

For the information of our readers we would state that said construction is a very old invention, and no broad patent claim for it can be valid. We lately had in our office a gun of this kind which was made more than twenty years ago, and others of the same sort can be obtained where that came from.

A Great Iron Plate.

The London *Mechanics' Magazine* says:—The Butterly Company's Codnor Park Iron Works, near Alfreton, Derbyshire, have recently rolled one of the largest wrought-iron plates ever made. Its dimensions are 42 feet long by 7 feet 2 inches wide in the middle, and 4 feet 10 inches at the ends by 2 inches thick, containing 252 superficial feet, and weighing 9 tuns. The largest plate in the Exhibition is from these works, containing 163 square feet, being 89 feet less than the above. The process of heating and rolling this giant plate has been successfully executed. Two of these plates are now rolled; they are for a beam-pumping engine of 84-inch cylinder, 10 foot stroke, and upwards of 800-horse power, which is being manufactured at the Butterly Iron Works, near Alfreton, for the Clay Cross Colliery Company.

Money Value of Sermons.

In June, 1859, Rev. Joseph N. Page, of Perry, Wyoming county, in this State, lost two sermons, which he afterward learned were in possession of Rev. J. B. Wentworth. That gentleman refused to restore them, and a suit for their recovery was referred to Elbridge G. Lapham of Canandaigua. Mr. Lapham decided in favor of Mr. Page; and to determine the question of costs, made an examination of the sermons. They were forcible in style and lucid expositions of Calvinistic doctrine. Mr. Lapham estimated their value at fifty dollars. Mr. Wentworth appealed to the general term of the Supreme Court, eighth district, and Mr. Lapham's decision was sustained. Heretofore courts have held that sermons had no value; but since Mr. Lapham's decision clergymen are "looking up."—*N. Y. Post.*

RECENT AMERICAN INVENTIONS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list :—

Boot and Shoe-Pegging Machine.—This invention relates to certain improvements in that class of boot and shoe-pegging machines in which the whole work is performed automatically, the boot or shoe sole being fed or presented to the awl and plunger, the holes made in the sole, the pegs driven therein and the pegs cut from the wooden strip and fed to the plunger. All these are arranged in such a manner that the work will be performed and the several parts operated from a single driving shaft, and it is believed by a more simple and efficient arrangement of means than has been hitherto employed for the purpose. The inventor is A. C. Gallahue, of Katonah, N. Y.

Boiler Feeder.—This invention consists in an apparatus composed of a close vessel arranged at a suitable distance above the intended level of the water in the boiler, and connected by two separate pipes with the boiler, and by a third pipe with an elevated reservoir from which it may be filled by gravitation, and having combined with it a novel system of valves and a novel arrangement of levers, weights and expanding chamber, and a float, whereby whenever the water in the boiler gets below a certain desired level the said vessel is caused, without manipulation, to empty itself into the boiler and be refilled from the reservoir or head, and to repeat such process until the water has risen again to the desired level, when the operation of the apparatus ceases. George W. Blake, of New York city, is the patentee of the above invention.

Mounting Ordnance.—This improvement relates principally to the invention which constitutes the subject matter of Letters Patent No. 13,249, dated July 17, 1855, viz., mounting a cannon in a carriage of circular form which is arranged to close the porthole or embrasure through which the piece works, but to turn freely in a horizontal direction, and which has an opening through it of suitable size and form to receive the gun and to allow it the necessary upward and downward movement to give it the desired elevation. The object of that invention was more especially the protection of the men working the gun, and while it failed to afford protection to the gun itself against an enemy's shot, it necessitates the use of a breech-loading gun. The principal objects of this invention are, first, not only to protect the men but to protect the gun from an enemy's cannon balls and other heavy projectiles, at all times except while being pointed or fired, when its muzzle is unavoidably exposed ; and, second, to enable a muzzle or breech-loading gun to be used equally well, as may be desired. Charles F. Brown, of Warren, R. I., is the inventor and patentee of this device.

Lamp Wick.—This invention consists of a tubular lamp wick having a nap on the inner side by which the capillary attraction is more perfectly developed, and it is made to constitute a better conductor and facilitate the ascension of the heavier kinds of oil and to serve equally well for the lighter oils and illuminating fluids, forming a perfect feeder for all kinds of illuminating oil and fluids in the market, and preventing explosions by providing for the free escape of any superabundant generation of gases or vapors in the lamp. Joseph H. Connelly and John Cook, of Wheeling, Ohio, are the patentees of this invention.

Cylinder for Polishing Gunpowder.—This invention consists in the arrangement of a valve made of leather fastened upon wood or other suitable rigid material, in such a manner that the leather constituting said valve keeps the form of the cylinder, and it can easily be shut perfectly tight by passing a wedge through a staple projecting from the back of the valve. It consists further in the arrangement of a stationary piece of wood fastened upon the valve and let into the inner surface of the cylinder and held there by screws whether of wood or of metal, in such a manner that the leather constituting the valve is drawn up flat against the inner surface of the cylinder, and consequently causes as little unevenness as possible on said surface, thereby enabling the cylinder to produce a perfectly polished powder which is not cut or bruised. The inventor of this improvement is R. H. Cunningham, of Schaghticoke, N. Y.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING AUGUST 26, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

36,265.—Walter Aitken, of Newark, Ill., for Improved Current Water Wheel :

I claim the arrangement of the horizontal power wheel, A, the floats, a, and the braces, b, as connected with A, in the manner described.

Second, I claim the combination and arrangement of thevertical axis, J, the wheel and axle, B c, the ratchet, d, the cogged semicircle, B, or its mechanical equivalent, for imparting motion to B, with the chain or its equivalent, e, for the purpose of elevating the wheel, A, all constructed and operating substantially as and for the purposes delineated and set forth.

36,266.—Albert Albertson, of New York City, for Improvement in Bottle Stoppers :

I claim the application and use of a self-closing stopper for bottles, &c., constructed and operating substantially as described, so as to produce a perfectly tight stopper and which will preserve any liquid or substance from evaporization or injury.

36,267.—R. W. Bender, of Chicago, Ill., for Improvement in Apparatus for Evaporating by Means of Steam :

I claim the application, combination and arrangement of the receiver, A, the pipes, E and F, and the double-acting pump, P, operating as described, for the purposes substantially set forth.

36,268.—E. L. Bergstresser, of Berrysburg, Pa., for Improvement in Horserakes :

I claim the construction and arrangement of the slotted sides, H H, in combination with the vibrating crossbar, K, and connecting rods, N, as arranged with the roller, Q, for the purpose of raising the teeth with greater regularity and facility, as herein described.

36,269.—A. G. Binns, of Goshen Township, Ohio, for Improvement in Churns :

I claim the arrangement and combination of the springs, G, rack, K, and wheel, I, arranged and combined as herein described and for the purposes set forth.

36,270.—G. W. Blake, of New York City, for Improved Self-Regulating Apparatus for Feeding Steam Boilers :

I claim, first, The expanding chamber, I J K L, loaded lever, M, float, R, rock shaft, Q, tappet, s, lever, P, rod, E, weight, G, catch, H, and hook, p, or their equivalents, the whole arranged and applied in combination with each other and the valve spindles, c d, and with the vessel, A, to operate substantially as herein specified.

Second, The arrangement of the steam and water pipes, C and D, and their valves and valve spindles, c d, in such manner that the two valve spindles will occupy the same horizontal line and thereby provide for the two valves being operated simultaneously by a weight acting vertically, substantially as and for the purpose herein described.

36,271.—Summer Blodgett, of Glover, Vermont, for Improved Winging Machine :

I claim the improved cloth squeezing machine as constructed with one elastic and one inelastic roller, and with the latter suspended in endless bearing bands supported by pulleys, as specified.

I also claim the combination and arrangement of the tub platform, B, with the roller frame, A, and its rollers, C D, as specified.

I also claim supporting the lower or wooden roller by means of the endless suspension bands and their pulleys, in combination with springs, the whole being arranged and applied to the said roller and its frame, substantially in manner and so as to operate as specified.

I also claim the arrangement of the adjusting screws and their washers with the springs, forks, endless bands and pulleys, as applied to the lower of the rollers, as set forth.

36,272.—Adeline J. Brooks, of Philadelphia, Pa., for Improvement in Corsets :

I claim a corset comprising the bowed pieces, c′ c′ c c c c c′ c′, straight pieces, B′ B B B′, within an intermediate zone or band and the gores, A, all combined and arranged substantially as described.

36,273.—C. F. Brown, of Warren, R. I., for Improvement in Mounting Ordnance :

I claim combining the gun with the spheroidal, spherical or circular portion, A, of the carriage by means of a vertically moving slide, B, or its equivalent, whereby it is permitted to recoil or move back far enough to bring its muzzle within the said portion of the slide and so permitted to be brought within the vessel in such manner as to enable it to be loaded either at its muzzle or breech substantially as herein specified.

36,274.—John Carton, of Utica, N. Y., for Improvement in Railroad Lamps :

I claim the perforated ring, one or more, or other equivalent material, in combination with the tubes, B′ and B, constructed and operating substantially as described.

36,275.—S. C. Chamberlin, of Berlin, Mass., for Improved Shoulder Stick, for Finishing Boot and Shoe Soles :

I claim the improved shoulder stick as made with the stationary gage, c, the separate and adjustable polisher or reducer, d, the socket, a, and the slider, f, and its clamp screw, h, applied to the socket, and a cap, b. substantially as specified.

36,276.—A. P. Cochran, of Louisville, Ky., for Improvement in Retainers for Tobacco Presses :

I claim my improved retainer for tobacco presses, the said retainer being composed of the base, H, the cap, F, the upwardly tapering and slotted connecting posts, G G′, the follower, J, the retaining rod, a, the washer blocks, e e′, and the screw nut, b, or the equivalents of said parts when arranged, combined and operating with each other, substantially in the manner and for the purpose herein set forth.

36,277.—J. H. Connelly and John Cook, of Wheeling, Va., for Improvement in Wicks for Lamps :

We claim a tubular wick having a nap on its inner surface, substantially as herein described.

36,278.—G. H. Corliss, of Providence, R. I., for Improved Steam Boiler :

I claim the method of constructing steam boilers by combining cylindrical circulating reservoirs with cylindrical tubular generators, arranged and connected substantially as and for the purposes specified.

36,279.—G. H. Corliss, of Providence, R. I., for Improved Method of Preventing Steam Boilers from Priming :

I claim the method of preventing the priming of steam boilers by conducting the steam from a common steam chamber to the main pipe, through numerous tubular orifices, arranged substantially as and for the purpose specified.

36,280.—G. H. Corliss, of Providence, R. I., for Improved Surface Condensers :

I claim constructing the tubes or condensing chambers of surface condensers with restricted apertures, substantially as described and for the purpose specified.

I also claim the combination of a receiver, A, with a series of tubes, B B, or their equivalents, each of which connects at one extremity with said receiver and at the other with the open air, substantially as described.

36,281.—G. H. Corliss, of Providence, R. I., for Improvement in Steam Generators :

I claim a combination of a surface condenser with a supplementary generator which takes its heat from the flue leading to the chimney, for the purpose set forth.

I also claim the combination of a surface condenser, a supplementary generator and coil of steam pipe, substantially as and for the purpose described.

36,282.—T. M. Davis, of Philadelphia, Pa., for Improved Refrigerator :

I claim a refrigerator having its inner walls or lining, A, made of glazed plates, of clay or stoneware, constructed and secured together, substantially in the manner described and set forth, for the purposes specified.

36,283.—John Dean, of Worcester, Mass., for Card Holder :

I claim forming a portable frame or porte carte-de-visite from a single sheet of metal, in the manner described herein.

36,284.—W. E. Doubleday, of Brooklyn, N. Y., for Improvement in Hats :

I claim a hat manufactured as herein specified, by inverting the surfaces after they have been shaped between heated dies, as set forth.

36,285.—Alexander Duncan, of York, Pa., for Improvement in Smut Machines :

I claim, first, The rotating concave plate, I, provided with a circular horizontal bottom, j, and vertical spikes, k, in connection with the stationary plate, K, provided with the teeth, l, and a pendent rim, m, arranged as and for the purposes specified.

Second, The cylinder, G, formed of the annular rims, f f, connected by the vertical rods or beaters, g, and provided internally with the fan, H, in connection with the perforated curb or hollow cylinder, L, and bars, M, having beveled toothed surfaces, o o, arranged as herein set forth.

Third, The combination of the air chambers, d d, blast spouts, N N, and fans, H C, arranged with the cylinder, G, to operate in conjunction therewith, as and for the purpose specified.

[This invention consists in the employment or use of a rotating concave spike beater, stationary convex toothed plate, vertical beaters, fans and expanding blast spouts, arranged in such a manner that the grain will be subjected to a thorough scouring and perfectly cleansed and separated from smut and other impurities.]

36,286.—A. K. Eaton, of New York City, for Improvement in the Manufacture of Soap :

I claim the use, as a constituent in soap making, of the refuse liquors which result from the treatment of straw or other vegetable fibres with alkalies, the said refuse liquors containing alkali and more or less silica and resin.

36,287.—Henry Eddy, of North Bridgewater, Mass., for Improvement in Cribs for Horses :

I claim, first, The metallic collar, A, with or without the flange, t, in combination with the crib, substantially as described and for the purpose herein set forth.

Second, I claim the use of the adjustable regulators of the feed, M N, in combination with the sides of the crib, E X, substantially as specified.

Third, I claim the elastic material, g, in combination with the crib, C, substantially as described and for the purpose herein set forth.

Fourth, I claim the manner of connecting and adjusting the plates, B and O, as and for the purposes specified.

Fifth, I claim the variable openings, d p, substantially as described and for the purpose herein set forth.

36,288.—W. M. Ellis and J. B. Ellis, of Washington, D. C., for Improvement in Steam Boilers :

We claim, first, Connecting the water legs, extending continuously from the front to the rear of the boiler to the shell of the boiler at the point of the working water line of the boiler, substantially as herein set forth.

Second, Gradually increasing the area of the tubes from the highest to the lowest tubes, as described.

36,289.—H. V. Faries, of Indianapolis, Ind., for Improvement in Pipe Wrenches :

I claim the jaw, C, of hook form, when attached to the jaw, B, and arranged relatively therewith to operate as and for the purpose herein set forth.

I further claim the spring, D, in combination with the jaws, B C, arranged as and for the purpose specified.

[This invention consists in having a jaw of hook form connected by a pivot to a rigid or stationary jaw at the end of a handle or lever, the hook jaw extending over the face of the rigid jaw, and all arranged in such a manner that the implement, when applied to its work, will grasp the article to be turned firmly, and adjust itself to its size or diameter without any special manipulation on the part of the operator, and at the same time, by the ordinary manipulation of the implement, release itself at each backward turn in order to admit of a fresh hold or grip being taken.]

36,290.—W. O. C. Fritschler, of Brooklyn, N. Y., for Improvement in Weighing Apparatus :

I claim the arrangement of the weighted box, D, containing the plumbing devices, k o l, in combination with scales marked on the covers, i j, and on the arc, d, and with the bent lever, A, all constructed and operating, substantially as shown and described.

[The object of this invention is a weighing apparatus which will operate without weight or spring, and which will combine the advantages of the bent lever balance, and of the steelyard.]

36,291.—J. S. Gage, of Dowagiac, Mich., for Improvement in Seed Coverers for Grain Drills :

I claim the coverers, A, open space, B, and projection, C, when combined and arranged to operate in the manner and for the purpose set forth.

36,292.—A. C. Gallahue, of Katonah, N. Y., for Improved Machine for Pegging Boots and Shoes :

I claim, first, The device as described for feeding the peg wood and pegs forward. To wit, by bringing the pegwood between the surface, r, and the roller, a′, Fig. 3, and in such connection with the ratchet, c′, Fig. 1, and pawl, d′, and sliding guide box, D′, that by each backward movement of said guide box, the ratchet, C′, is brought against the stationary pawl, d′, and the peg wood and pegs are thereby moved forward previous to the descent of plunger H, as set forth.

Second, Conveying the pegs forward by means of the peg receptacle, t‴, directly over the hole or chamber in the stationary shoulder, U, and driving them through said shoulder in such a manner that the plunger shall be limited in its descent by the lower surface of the shoulder, so as not to indent the sole.

Third, Cutting off the pegs laterally from a strip of pegwood, by the movable knife, E′, being brought against the surface of r, Fig. 3, as set forth.

Fourth, The arrangement of the two frames, J M, as shown. One, J, connected with the weight, L, and the other, M, pivoted to J, and used with or without the spring, R, for the purpose of keeping the boot or shoe properly presented to the awl and plunger, and thereby obviating the necessity of guiding the shoe by hand.

Fifth, The combination of the two slotted levers, E E′, and the awl and plunger bars, F F′, box, I, and guide box, D′.

Sixth, The double-jointed feeding pawl, Z, operated from the shaft, B′, as shown, when used in combination with the ratchet, X, pinion, W, and rack, P, on block, O, placed in the frame, M, and arranged substantially as shown, to properly feed the boot or shoe to the awl and plunger, and also to adjust its operations to the various sizes of the shoes pegged.

36,293.—W. F. Grapler and A. J. Cutter, of Lewisburg, Pa., for Improvement in Car Couplings :

We claim the use of the hinge pin or bolt, A, in movable block, B, in

combination with the spring cap, C, to throw it back into position, to be a self-coupler.

Also the lever, D, when the same is used in combination with said hinge pin or bolt, A, and movable block, B, as set forth and described.

36,294.—Robert Hamilton, of Franklin, Ind., for Improved Portable Sugar Evaporator:

I claim giving such a shape to the furnace box, B, that it can be combined with the head of the evaporating pan, A, by means of the flange, F, and in such a manner that the said flange will prevent the incandescent fuel from being brought into direct contact with the said pan, whilst it will also prevent the flame from passing directly into the flues, g g, all substantially as herein set forth.

When the evaporating pan, A, is supplied with the flange, F, and with the flues, g g, I also claim combining the dampers, l and m, with the furnace box, B, substantially in the manner and for the purpose herein set forth.

36,295.—W. W. Hanes, of Covington, Ky., for Improvement in Explosive Projectiles for Ordnance:

I claim, first, Constructing projectiles for ordnance with an outside shell consisting of two parts screwed together, for the purpose and in the manner set forth.

Second, I also claim an independent inside shell or charge chamber, with two or more nipples and percussion caps attached, for the purpose of securing greater safety in charging, and certainty of fire when in use, substantially as described.

Third, I further claim the cushion, C, for the purpose and in the manner specified.

Fourth, I claim the projections or ribs, E E, with their corresponding grooves, for the purpose herein set forth.

Fifth, I claim the combination of an outside shell made in two parts, A A, with an independent charge chamber, B, containing two or more nipples and percussion caps, with the projections or ribs, E E, and cushion, C, substantially as described.

36,296.—G. L. Harris, of Mobile, Ala., and Samuel Harris, of Springfield, Mass., for Improvement in Sifting Machines:

We claim the inclined sifter, A, in combination with the triangular cam, E, and double-inclined agitator, k, in the manner and for the purpose substantially as described.

36,297.—J. K. Harris, of Allensville, Ind., for Improvement in Baling Presses:

I claim, first, The levers, J J, and arms, N N, in connection with a follower and beater, B, arranged to operate as and for the purpose herein set forth.

Second, The slides, O O, connected with the arms, N N, of the levers, J J, in connection with the sliding bars, d d, on the follower, B, all arranged substantially as and for the purpose herein set forth.

[This invention consists in combining a follower with a system of levers, all constructed and arranged in such a manner that the follower may be made to serve the double purpose of a follower and a beater, the follower in the last-named capacity filling the press box and compacting the material to be compressed therein, so as to be in proper condition for the subsequent pressing operation of the follower.]

36,298.—S. H. Hartman, of Pittsburgh, Pa., for Improvement in Machines for Punching Linch-Pin Holes and Cutting Off the Journals of Axles for Wagons, &c.:

I claim the combination of the clamps, the cutter and the punches, for holding, cutting off, and punching the linch-pin holes in the journals of wagon and other similar axles, the mechanism being constructed and operating substantially as herein described.

36,299.—S. H. Hartman, of Pittsburgh, Pa., for Improvement in Slide Valves for Steam Engines:

I claim, in combination with a valve open through the center, or with a lid made in two pieces, a groove or recess in one piece containing rubber packing, and a tongue or shoulder in or on the other piece, to bear against said rubber packing, for the purpose of making the sides of the valve work steam tight, or nearly so, on opposite sides of the chest, as set forth.

36,300.—Josiah Hayden, of Haydenville, Mass., for Improvement in Water Elevators:

I claim, first, The curves, c d c, in combination with the straight rods, a, and hooks, b, embracing the curves, c c, of another link, as and for the purpose specified.

Second, I claim the windlass wheel, W, in combination with a flat chain, constructed as herein described and for the purpose set forth.

36,301.—William Larrabee, of Clermont, Iowa, for Improvement in Grain Winnowers:

I claim the upright suction blast spout, A, in combination with the valves, F H, arranged as shown, and the fan, D, as and for the purpose herein set forth.

I further claim the supplemental vaves, K K, adjustable hopper, M, and draught passage, e, when arranged and combined with the valves, F H, as and for the purpose herein set forth.

[This invention consists in the employment or use of an upright spout, having a fan connected with it at its upper end, so as to cause or produce a suction blast therein; in connection with a series of valves arranged in such a manner with the spout as to produce lateral draught entrances, and insure a perfect separation of all light impurities from the grain, and also the perfect separation of wheat from oats, &c., &c.]

36,302.—Francis Murray, of Baltimore, Md., for Improvement in Stamp Heads for Crushing Ores:

I claim, first, In a stamp head, the working face of which is cast in a chill, and is capable at pleasure of being attached to or removed from an upper or main section, so constructing the same, by casting it around and upon a wrought-iron shank, that said shank shall serve as a coupling to unite the shoe to the upper section of the stamp head, and also be capable of being used thereafter to cast a new working face or shoe upon, substantially as described.

Second, In connection with a stamp head for crushing ores, I claim the use of a ductile metallic buffer or its equivalent, substantially in the manner and for the purpose described.

36,303.—H. W. Putnam, of Cleveland, Ohio, for Improved Mangle:

I claim the frame work, A F G H, in combination with the rollers, B B′, finger gear, I I, foot piece, K, claw and set screw, L, when these parts are constructed, arranged and operated, substantially as and for the purpose set forth.

36,304.—E. A. L. Roberts, of New York City, for Improved Thermometrical Steam Gage:

I claim a metallic gage, consisting of one or more fusible metals, in combination with the indicator or indicators, b b, or their equivalent, so as to indicate by their position or motion, and either with or without an alarm, the temperature of a steam vessel, the whole constructed substantially as and for the purpose set forth.

36,305.—Harry Seymour, of Dartmoor, Great Britain, for Improved Artificial Fuel:

I claim the composition for an artificial fuel, made of the ingredients and in the manner and proportions herein set forth.

[This invention consists in the employment or use of petroleum in its natural or in a refined state, or of coal oil or allied manufactured substances, in combination with certain mineral substances, such as silica, alumina, lime, and oxygenated manganese, which are mixed with refuse vegetable matter, such as peat, earth, saw dust, tanner's bark, green roots, &c., for the purpose of obtaining a fuel which can be used everywhere in place of wood or coal. Mr. Seymour's address is 48 St. Francis Xavier street, Montreal, C. E.]

36,306.—Aaron Smith, of Brooklyn (E. D.), N. Y., for Improved Gas Regulator:

I claim combining the throttle or other balanced valve, E, and floating inverted cup, D, by the arrangement of passages, C c k i, and crank connections, h h k k, substantially as herein described.

[This invention consists in a certain arrangement of the passages provided between a throttle or other balanced valve, employed to regulate the flow of gas and the interior of an inverted cup, within which the pressure of the gas acts with a tendency to close the valve, and arrangement of the connections between the said valve and cup, whereby a regulator of very simple construction is obtained, and which is very effective in its operation.]

36,307.—C. W. Smith, of Evans, N. Y., for Improved Washing Machine:

I claim the combination of the dasher, F, the bar, B, the standards, C E, and the lever, D, arranged to be used in connection with an ordinary wash tub, substantially as described.

36,308.—P. A. Stecher, of New York City, for Improved Lamp Shade Holder:

I claim a lamp shade holder, A, constructed and applied, substantially as herein shown and described.

[The object of this invention is to produce a simple and cheap device for supporting shades on lamp chimneys. The invention consists in a holder made of a series of radial braces, the ends of which are bent in opposite directions, and which are connected and held in place by two or more rings, in such a manner that the same, when applied to a lamp chimney, rests with the upper ends of its braces on the bulb and its lower ends support the shade.]

36,309.—Alois Schweizer and George Jansen, of Cleveland, Ohio, for Improved Scrubbing Brush:

We claim, as a new article of manufacture, a combined floor scrubber and wiper, when the several parts are constructed and arranged, substantially in the manner and for the purpose herein described.

36,310.—R. M. Stivers and G. W. V. Smith, of New York City, for Improvement in The "Fifth Wheel" of Carriages:

We claim the combination of the stay rod or spring brace, G, with the perch, A, front axle, C, and parts, a and b, the whole constructed and arranged in relation to each other, as and for the purpose set forth.

36,311.—A. E. Teal and William Ransom, of Cicero, Ind., for Improvement in Smut and Grain Cleaning Machines:

We claim, first, The valves, l, placed within cylinders, N, on the spouts, K, and regulated by springs and nuts, as shown, or their equivalents, in connection with the valves, L M, and discharge openings, A′, for the purpose specified.

Second, The tubular perforated shafts, J D, of the beater, I, and fan, C, when said beater and fan are arranged in connection with the suction spouts, K K, and blast spout, E, to operate as set forth.

[The object of this invention is to obtain a simple and efficient machine by which smut may be thoroughly broken and separated from the grain, and the latter deprived of all light impurities, and also separated from any chess which may be in it.]

36,312.—Eli Thayer, of Worcester, Mass., for Improvement in Plane Angulometers:

I claim the pendulum moving upon three or more bearings in the same plane, and carrying upon its top a graduated arc, and its combination with the spherical surface, and the opening therein, substantially as set forth and described in the accompanying specifications and drawings, and for the purpose indicated.

36,313.—W. H. Towers, of New York City, for Improvement in Pins:

I claim a pin for securing clothing and other objects, made with a slight spherical or oval enlargement near the point, in the manner and for the purpose described.

36,314.—J. F. Townsend, of Cambridgeport, Mass., for Improvement in Spermatorrheal Rings:

I claim the instrument composed of the two bows, A B, made with a rest, b, and jointed together as described, the band, C, adjusting screw, e, set screw, a′, and nuts, g f, the whole combined as herein set forth.

36,315.—W. F. Warburton, of Philadelphia, Pa., for Improvement in Army and Navy Caps:

I claim the loose fold, b, with its elastic loops or their equivalents, in combination with the detachable cape, G, the whole being arranged substantially as set forth for the purpose specified.

36,316.—J. R. Whittemore, of Chicopee Falls, Mass., for Improvement in Hay or Feed Cutters:

I claim, first, The combination of the hopper, B, legs, C C, and flanged mouth piece, A, constructed as herein described, whereby the mouth piece serves as a support for B and C, substantially in the manner and for the purpose as herein set forth.

Second, The combination of the cutter lever, E, bolt, h, and wedge, o, when constructed and operating substantially in the manner and for the purpose herein described.

36,317.—Jacob Wister, of Greencastle, Pa., for Improvement in Flour Bolts:

I claim the use of the slide rods or braces, D, extending from rib to rib, and carrying sliding balls or knockers, E, thus bracing the ribs, and at the same time bringing the action of the knockers chiefly upon the ribs and bolting cloth, substantially in the manner and for the purposes set forth.

36,318.—G. W. Woodworth, of Cleveland, Ohio, for Improvement in Water Elevators:

I claim the combination of the flat places, A, and inverted arch or section of a circle, B, with the bars forming the perimeter which connects the forks, as above described.

36,319.—Edwin Bailey (assignor to himself and Henry Mc Shane), of Baltimore, Md., for Improvement in Cut Offs for Hydrants:

I claim the combination of the spring cut off, d, with the series of openings or perforations, a, for the purpose of gradually shutting off the through flow of water, to prevent jarring and breaking of pipes, substantially as described.

36,320.—R. H. Cunningham (assignor to W. P. Bliss), of Schaghticoke, N. Y., for Improvement in Cylinders for Polishing Gunpowder:

I claim, first, The arrangement and combination of the piece of leather, b, with the block of wood or metal, c, and strip, d, each being shaped to correspond to the inner surface of the cylinder, substantially as and for the purpose described.

Second, The arrangement of the stationary strip, d, let into the inner surface of the cylinder, in combination with the valve, B, as and for the purpose shown and specified.

36,321.—Samuel Mason (assignor to the Northfield Knife Company), of Northfield, Conn., for Improvement in Pocket Knives:

I claim, as an improved article of manufacture, a pocket knife having a handle of malleable cast iron with a rough or corrugated exterior, in imitation of buckhorn, as herein set forth.

[This invention consists in constructing the handle of the knife of malleable cast iron, and with a corrugated external surface in imitation of buckhorn, whereby a much more durable knife is obtained than any hitherto constructed, and one which may be manufactured at a less cost.]

36,322.—William Peters (assignor to himself and Alfred Buck), of Baltimore, Md., for Improvement in Covering Steam Boilers:

I claim covering steam boilers, pipes, cylinders, &c., with the sheets, plates, &c., of the composition herein named.

36,323.—C. D. Spears, of Lisbon, Maine, assignor to himself and F. Buckman, of Bowdoinham, Maine, for Improvement in Water Wheels:

I claim, first, The penstock, A, and the scroll, B, the latter being placed within the former and constructed of segments, b, arranged eccentrically with the wheel, C, as shown in combination with the wheel, C, and central discharge opening, f, all arranged as and for the purpose set forth.

Second, The buckets, e, attached to the arms, d, of the wheel, C, in an oblique position, as shown and described, when said wheel thus constructed is used in combination with the scroll, B, penstock, A, and central discharge opening, f, as herein specified.

[This invention relates to an improved water wheel of that class which are placed on vertical shafts within a scroll or case fitted, and commonly termed horizontal wheels. The invention consists in the employment of a scroll or case provided with a plurality of water inductive passages, and fitted within a penstock; in connection with a wheel provided with oblique buckets and a central discharge opening, whereby it is believed that the water is made to act in a very advantageous manner upon the wheel, and a good percentage of the power thereof obtained.]

36,324.—J. M. Stiven (assignor to himself, M. Tuomey and John Elder, Jr.), of New York City, for Improved Boiler Feeders:

I claim the float, f, provided with the pipe, g, in combination with the supply pipe, e, and valve, i, the parts being fitted and acting in the manner and for the purposes specified.

36,325.—E. A. Turpin, of New York City, for Improvement in Breech Loading Ordnance:

I claim closing the breech of a piece of ordnance or other form of firearm by means of an axial plug, having a smooth cylindrical surface, and a conical end fitting a corresponding seat in the breech of the gun, the said plug being adapted to be turned upon its seat and held firmly in contact therewith by means of a tapering key or wedge, C, passing transversely through the breech and plug, all as herein shown and described for the purposes set forth.

[The peculiarity of this invention consists in fitting the breech plug in the breech of the gun, so that it may be turned around as it is inserted, so as to grind out any refuse left on the seat, and thus secure a close adaptation of the breech plug to the seat.]

36,326.—Isaac Winslow, of Philadelphia, Pa., assignor to J. W. Jones, of Portland, Maine, for Improvement in Preserving Vegetables in Hermetically Sealed Cans:

I claim preventing the bursting of hermetically sealed cans or other vessels, while they are exposed to heats for cooking or preserving their contents, by means of puncturing such cans or vessels when first heated, or otherwise giving vent to the contained air soon after heating, the cans or vessels being thereafter immediately resealed and the heat continued, substantially in the manner and for the purposes set forth.

36,327.—Stuart Perry, of Newport, N. Y., assignor to C. H. A. Carter, of New York City, for Improvement in Circuit Horsepowers:

I claim the combination of friction wheels and idlers, substantially in the manner and for the purpose herein described.

I also claim in combination with the friction wheels and idlers, the elastic pad, f, and nut, e, for regulating the pressure between the rolling contact surfaces, substantially as and for the purpose set forth.

RE-ISSUES.

1,331.—Chauncey Thomas and D. P. Nichols, of Roxbury, Mass., assignees of Chauncey Thomas, aforesaid. Letters Patent No. 18,254, Dated September 22, 1857, for Improvement in Carriage Props:

We claim the improved carriage prop as constructed with a screw or a loose shoulder cap, D, combined with a joint bar standard, A, and arranged between the leather, L, and the joint bars, G H, all placed on the standard, or the latter passing through them and secured in position by the nut, I, substantially as described.

1,332.—D. G. Littlefield, of Albany, N. Y. (Letters Patent No. 133, Whole No. 1,237, Dated January 24, 1854. Reissued November 19, 1861,) for Improvement in Stoves:

I claim the illuminated exterior wall or cylinder, M, with openings, f, therein glazed with isinglass or any transparent substance, or any equivalent therefor, in combination with a coal supply chamber and an intermediate chamber, G, wherein gas is consumed, at, or around the fire pot, or any appendage thereof, substantially as and for the purpose herein described and set forth.

1,333.—D. G. Littlefield, of Albany, N. Y. (Letters Patent No. 133, Whole No. 1,237, Dated January 24, 1854. Reissued November 19, 1861,) for Improvement in Stoves:

I claim the employment of a fire pot having a vertical fire grate around the same, forming a downward continuation of a coal supply pot, in combination with a gas consuming chamber between the outer case and the connected fire and coal supply pot, substantially as and for the purposes as herein described and set forth.

1,334.—D. J. Littlefield, of Albany, N. Y. (Letters Patent No. 132, Whole No. 1,236, Dated January 24, 1854. Reissued November 19, 1861,) for Improvement in Stoves:

I claim an organization which will permit the gases of the supply coal, and the gases of the incandescent coal to burn laterally below, and outside of the coal supply chamber, and entirely down to the grate, and thereafter circulate the spent gases or a portion of them, over the top of the coal supply chamber; and finally discharge them through a flue leading outside the room in which the stove is situated.

1,335.—D. G. Littlefield, of Albany, N. Y. (Letters Patent No. 132, Whole No. 1,236, Dated January 24, 1854. Reissued November 19, 1861,) for Improvement in Stoves:

I claim the combination of the fire pot, E, with the coal supply cylinder, F, immersed within the outer cylinder, M, which forms the chambers, G and G′, substantially as and for the purpose herein described.

1,336.—Lewis Moore, of Ypsilanti, 'Mich. (formerly of Bart, Pa.) Letters Patent 224, Dated July 2, 1850. Reissued October 12, 1852, for Improvement in Seed Planters:

I claim, first, A seeding slide having apertures with sides oblique to the sides of corresponding apertures in the hopper bottom or plate, u, when combined with any suitable device to impart a reciprocating motion to the said slide, substantially as described.

Second, In combination with a hopper or seed box having a number of apertures for the discharge of seed, I claim a perforated seeding slide having a reciprocating motion transverse to the motion of the machine, and adjustable in extent for the purpose of varying the quantity of seed sown.

Third, The combination of the perforated vibrating lever, p, and pivoted rod, m, with a cam, f, and seeding slide, j, to vary the motion of the said slide, substantially as and for the purposes explained.

Fourth, Raising or lowering the drill teeth or hoes simultaneously by means of chains, a′, or their equivalent, attached to the rear edge of a flat bar or board, X, hinged by its front edge to the frame, and provided with a lever, y, projecting backward from it, all substantially as herein shown and described.

Fifth, The combination of the hook or catch, b′, flat bar or board, X, and lever, y, all constructed, arranged and employed in the manner and for the purposes set forth.

Sixth, Supporting the hopper or seed box upon the frame of the machine by means of brackets, b2 b2, straddling the beam, a2, so as to secure the hopper in position without fastenings, and permit its ready removal.

Seventh, Suspending the seeding slide beneath the hopper by means of loops, w, placed beneath the apertures, h i, in the hopper bottom, substantially as and for the purposes set forth.

DESIGN.

1,653.—Salathiel Ellis, of Mautorville, Minn., for Design for a Medallion of President Lincoln.

The Tuttle Comet.—The comet now visible was discovered by H. P. Tuttle, of the Cambridge Observatory, and has, consequently received his name. It has not been observed before. It passed its perihelion on the 22d of August, and is now becoming more dim, as it sweeps away into the cold and darkness of space.

PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes in the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, excepting reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs) on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but, if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats, in English and German, furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row, New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office No. 37 Park-row, New York, or either of our Branch Offices.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief story of the case, inclosing the official letters, &c.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

Notes and Queries

P. S. & Co., of Ohio.—You generate steam in a boiler and raise the pressure to 110 pounds to the square inch. You wish to take steam from this boiler into a vessel which will bear safely only 50 pounds to the square inch, and you propose to introduce a check valve in the pipe which leads from the boiler to the vessel, loading the valve 60 pounds to the square inch. We see no reason why this plan should not work; of course you will have a safety valve in the vessel to allow of the escape of any steam which might leak past the check valve.

J. W., of Ohio.—We rank ourselves among the admirers of Bacon, still, in reading the "Novum Organum" the idea with which we were most impressed was the improvement in the method since his day.

S. W. W., of Iowa.—The sun being larger than the aperture in the window, each point in the area of the aperture corresponds to the minute opening in the camera obscura, forming an image of the sun; and these images are so nearly superposed one over the other that the resulting figure is circular.

H. I. W., of N. Y.—Cream of tartar is obtained from the settlings of wine in the inside of wine casks. The crude tartar separates from the wine and adheres to the sides of the cask in the form of a dark-brown scale called argol, resembling sandstone. It is afterward purified, decolored and converted into cream of tartar.

C. C., of N. H.—It is impossible for us to judge of the patentability of your several inventions without a description and drawing of them. You are certainly experimenting in a good line of invention. You had better send to us for a circular of information, and at the same time be preparing models of the different inventions.

L. C., of Mass.—An extension for a patent must be applied for by the original patentee if he is living. The assignees under the first term of the patent have no rights under the extension.

J. C. P., of Ohio.—The idea of a steam battery to operate on common highways and railroads has been suggested to us a number of times. Your mode of constructing such a battery may be new but the idea is not.

R. S., of Conn.—You can stain both brass and copper and render them nearly black with a strong solution of nitrate of silver containing a little free acid to bite into the metal. Wash the copper or brass, after the stain is obtained, with a little dilute ammonia to neutralize the free nitric acid.

J. W., of N. J.—We have never been able to obtain the account of any set of experiments made with springs to test their power according to their thickness, breadth, temper and shape. We hope you will make a careful and extended set of experiments and present the results of your labors to the public for the benefit of science.

R. W. T., of Pa.—The water blower consists of a shower of water falling within a vertical cylinder or case, with holes in its sides. The water carries a current of air down with it, which is expelled through a nozzle near the bottom of the cylinder. It has been used for the blast of a forge.

K. T. B., of Mass.—One cubic foot of ideal steam weighs 0·050220. This is calculated from the known weights of hydrogen and oxygen. One cubic foot of hydrogen weighs 0·005592; half a cubic foot of oxygen weighs 0·044628. These two combine together, collapse and form one cubic foot of steam.

J. J. R., of N. Y.—High pressure steam is certainly the most economical to use. We advise to use as high pressure steam as your boiler will stand. Be sure and get a strong boiler.

E. S., of N. J.—You will find just the articles you want on the spectroscope and spectrum analysis on pages 292, 298 and 299, Vol. V. (new series) SCIENTIFIC AMERICAN. Kirchkoff has recently published a work on the subject which has been translated in England. It could probably be had through Balliere Brothers, of this city. Wells's "Annual of Scientific Discovery" is published by Gould & Lincoln, of Boston. The price we presume is about one dollar

H. W., of N. Y.—The product of the speed of a machine per minute and the resistance in pounds is the rate of its work per minute in foot-pounds, and so on for an hour. It is usual to express the speed of machines in feet per minute, such as 330 pounds lifted 100 feet per minute is a horse power. The rate of work of a machine means the quantity of work which it performs in a given interval of time. The unit of a horse power is 33,000 foot-pounds per minute. The horse power of an engine in France is 4,500 killogrammes per minute or 32,549 foot-pounds.

Z. Van K., of Wis.—You will find an illustrated description of a hard india-rubber Bœhm flute on page 284, Vol. I. (new series) SCIENTIFIC AMERICAN. The peculiarity of this flute consists in its having keys for stopping all the holes, instead of having some holes open and others closed with keys, as in the common flute.

G. H., of N. Y.—A suit on a patent must be brought in a United States court; State courts have no jurisdiction over patent cases.

W. McK., of C. W.—All steel tools are liable to become temporarily magnetized, if the atmosphere is very dry, when they are rubbed upon steel surfaces. They will also become permanently magnetized when rubbed in the right direction upon permanent magnets.

Money Received

At the Scientific American Office on account of Patent Office business, from Wednesday, Aug. 28, to Wednesday, Sept. 3. Persons having remitted money to this office will please to examine this list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

A. L. F., of N. Y., $15; D. M. A., of Me., $50; L. D. B., of N. J., $25; J. A., of Pa., $25; G. T., of Mass., $15; J. A. P., of N. Y., $43; L. K., of Mass., $15; T. H. R., of N. J., $15; C. L. R., of Wis., $15; W. F., of Mich., $25; H. B. M., of N. Y., $25; G. C., of Mich., $40; D. R. W., of Iowa, $15; I. B., of Ky., $28; T. R., of N. Y., $40; N. P., of N. Y., $15; G. M. C., of Me., $15; W. P. B., of Mich., $30; Z. G. H., of Iowa, $25; J. N., of England, $40; J. M. D., of N. Y., $15; N. R., of N. Y., $15; I. D., of Mo., $25; W. F., of R. I., $15; M. G., of Pa., $15; E. D., of Mass., $12; M. J. H., of Ill., $10; H. S., of Pa., $25; T. H., of N. Y., $15; J. S., of Pa., $15; J. L., of Iowa, $40; J. W., of Ky., $10; J. D. W., of N. Y., $15; T. & R., of Wis., $25; J. A. O., of N. Y., $30; R. M., of N. Y., $20; J. McK., of N. Y., $20; A. Q., of N. Y., $20; A. B., of N. Y., $45; J. A. P., of N. Y., $20; C. H. P., of N. Y., $20; J. B., of Ill., $20; J. McH., of Ohio, $40; B. R., of Mass., $40.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from August 28 to Wednesday, September 3, 1862:—

H. B. M., of N. Y.; Z. G. H., of Iowa; W. F., of Mich.; J. B., of Ky.; W. P. B., of Mich.; L. D. B., of N. J.; D. M. A., of Me.; J. A., of Pa.; E. D., of Mass.; C. E. S., of Wis.; J. N., of England; T. R., of N. Y.; H. I. H., of Ill.; H. S., of Pa.; I. D., of Mo.; J. A. O., of N. Y.; T. & R., of Wis.; J. McK., of N. Y.; J. McH., of Ohio.

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INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application at this office. Address MUNN & CO., No. 37 Park-row, New York.

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For further particulars, address—

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RENSSELAER POLYTECHNIC INSTITUTE, TROY, N. Y.—The thirty-ninth Annual Session of this Institution for instruction in the Mathematical, Physical and Natural Sciences, will commence on Wednesday, Sept. 17, 1862. Appropriate quarters, and a full supply of apparatus, will be provided, so that all the Courses of Instruction can be given precisely as heretofore. The new buildings for the Institute will be placed on a more commanding site, and be constructed as soon as possible.

The Annual Register, containing full information, can be obtained from Prof. CHARLES DROWNE, Director. 6 6*

THE CRAIG MICROSCOPE—PATENTED FEBRUARY 18, 1862, magnifying 100 diameters or 10,000 times, yet so simple that a child can use it. Sent by mail, postage paid, on receipt of $2 25. Liberal discount to the trade. Address HENRY CRAIG, 182 Centre street, New York City. Eight mounted objects will be sent for $1. 8 5

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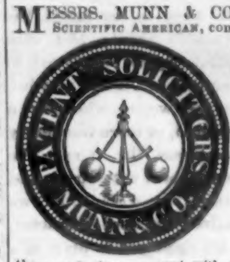
SCIENTIFIC AMERICAN Office, No. 37 Park-row, New York.

IMPORTANT TO INVENTORS.

MESSRS. MUNN & CO., PROPRIETORS OF THE SCIENTIFIC AMERICAN, continue to solicit patents in the United States and all foreign countries, on the most reasonable terms. They also attend to various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Courts Interferences, Opinions relative to Infringements, &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of sixteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, or sending a model or drawing and description to this office.



Consultation may be had with the firm between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in t CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Offices are cordially invited to call at their office.

They are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business they have Offices at Nos. 66 Chancery Lane, London 29 Boulevard, St. Martin, Paris, and 26 Rue des Eperonniers, Brussels. We think we may safely say that three-fourths of all the European Patents secured to American citizens are procured through our Agency.

A pamphlet of information concerning the proper course to be pursued in obtaining Patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office, or either of the Branches. They also furnish a Circular of information about Foreign Pat nts.

The annexed letters from former Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

MESSRS. MUNN & CO.:—I take pleasure in stating that while I held the office of Commissioner of Patents MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE came through your hands. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly, CHAS MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster General of the United States, he addressed to us th subjoined very grateful testimonial:—

MESSRS. MUNN & CO.:—It affords me much pleasure to be t stimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy marked ability, and uncompromising fidelity in performing your professional engagements. Very respectfully,
Your obedient servant, J. HOLT.

MESSRS. MUNN & CO.—*Gentlemen:* It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your Agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, WM. D. BISHOP.

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Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

Erfinder, welche nicht mit der englischen Sprache bekannt sind, können ihre Mittheilungen in der deutschen Sprache machen. Skizzen von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen beliebe man zu addressiren an
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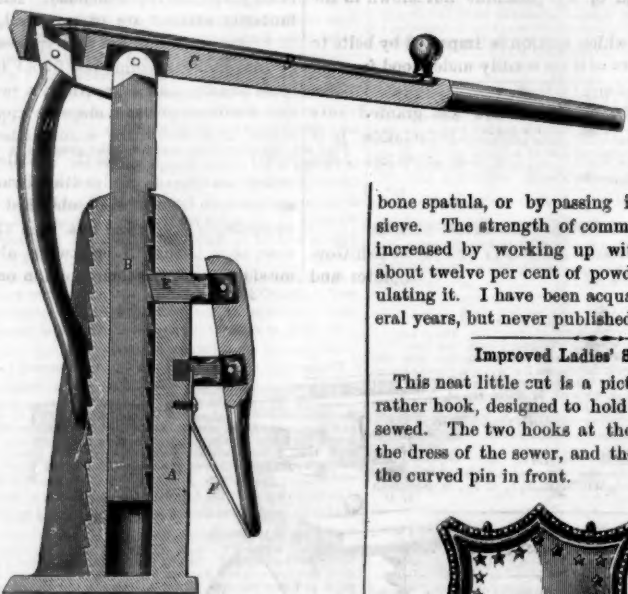
Improved Lifting Jack.

In all large iron works and other establishments where heavy masses of iron have to be raised, the lifting jack is an indispensable article, and with nearly every one of the great wagons employed in transporting merchandise across the western prairies, a jack is carried to raise the wagon whenever a wheel becomes mired in the mud, or more frequently when there is occasion to grease the axles. The jack usually employed is constructed with a rack and pinion; the pinion being turned by a crank, but we here illustrate a jack of entirely different character, in which a lever and pawl are employed in place of a crank and pinion.

The engraving represents a sectional view. The stock, A, is a block of cast iron with a broad base to rest upon the ground, and a rectangular slot or bore down the middle, in which the rack bar, B, slides



freely up and down. The lever, C, is pivoted to the upper end of the rack bar, and carries the pawl, D, at its outer end. This pawl has notches in its lower end which catch into the rack in the back edge of the stock, A. A second pawl or stop, E, is fitted to slide freely in a slot in the front side of the stock, A, and catches into a rack in the edge of the bar, B; this stop being beveled at its inner end so as to be pressed outward by each tooth of the rack as the bar rises, and being forced inward again by the spring, F.

It will be seen from this arrangement that if the long arm of the lever, C, is worked up and down, the bar, B, will be gradually raised with great force out of the stock; thus lifting any weight under which it may be placed.

To drop the bar, B, back into the stock, both pawls must be drawn away from their respective racks. To facilitate this withdrawal, a rod, *g*, is attached to the short arm of the pawl, D, and a button, *h*, is secured to the end of this rod on the upper side of the lever, C, within easy reach of the hand of the operator. The stop, E, is withdrawn by pressing either the hand or foot against the lower end of the lever, I.

We are informed that the demand for these jacks is greater than can be supplied by the manufacturers.

The patent for this invention was granted through the Scientific American Patent Agency, August 12, 1862, and, for the purchase of state or country rights, or for any further information in relation to it, enquiries may be addressed to the inventor, Daniel Fasig, at Rowsburg, Ashland county, Ohio.

Cheap Alcohol.

A method of extracting alcohol from coal gas has been discovered at St. Quentin, France, by a young chemist named Cotelle. He announces that he can sell his alcohol at 25 francs the hectoliter, while the most inferior spirits produced from other articles is selling for 75 francs the hectoliter.

One equivalent of alcohol contains 4 equivalents of olifient coal gas and 2 equivalents of water. There is nothing new about the obtaining of alcohol from gas; this has been done before, but it cannot be manufactured so cheaply as from grain. Olifient gas can be made with alcohol as follows:—Take 1 ounce of strong alcohol and 4 ounces of concentrated sulphuric acid and place them in a glass retort capable of holding 10 ounces and apply a gentle heat. When the liquor boils olifient gas is given off. The sulphuric acid should be added to the alcohol in small quantities and the retort should be shaken after each addition. The olifient gas thus obtained for experiment is usually passed through a weak solution of potash to wash it.

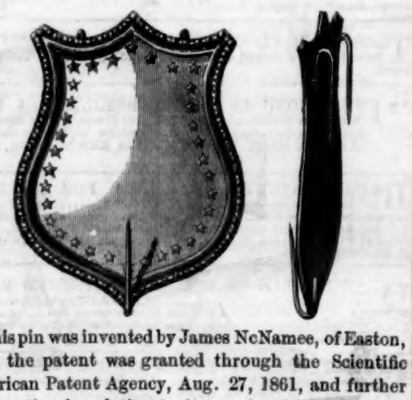
A New Explosive Compound.

John Hosley, F. C. S., communicates the following to the London *Chemical News*:—

If nine parts of well dried and finely powdered chlorate of potash be mixed with three parts of finely-powdered galls, a highly-explosive compound is formed which needs no granulation. As it will not admit of trituration in a mortar, the mixture should be made on paper by means of a bone spatula, or by passing it through a fine brass sieve. The strength of common gunpowder may be increased by working up with the powdered meal about twelve per cent of powdered galls, and regranulating it. I have been acquainted with this for several years, but never published it before.

Improved Ladies' Sewing Pin.

This neat little cut is a picture of a sewing pin or rather hook, designed to hold cloth while it is being sewed. The two hooks at the back are caught into the dress of the sewer, and the work is hooked upon the curved pin in front.



This pin was invented by James NcNamee, of Easton, Pa.; the patent was granted through the Scientific American Patent Agency, Aug. 27, 1861, and further information in relation to it may be obtained by addressing J. Bernard Wilson, at Easton, Pa.

How to Use a Barometer.

The following are a few words of advice by a correspondent of *Chambers's Journal* in regard to taking care of the barometer. He says:—

It is an invaluable fact, and too often overlooked, that the state of the air does not show the present, but coming weather, and that the longer the interval between the barometric signs of change and the change itself, the longer and more strongly will the altered weather prevail; so, the more violent an impending storm, the longer warning does it give of its approach. Indications of approaching change of weather are shown less by the hight of the barometer than by its rising or falling. Thus, the barometer begins to rise considerably before the conclusion of a gale, and foretells an improvement in the weather, though the mercury may still stand low. Nevertheless, a steady hight of more than thirty inches is mostly indicative of fine weather and moderate winds. Either steadiness or gradual rising of the mercury indicates settled weather, and continued steadiness with dryness foretells very fine weather, lasting sometime. A rapid rise of the barometer indicates unsettled weather; a gradual fall of one-hundredth of an inch per hour indicates a gradual change in the weather, and moderate rising of the wind; several successive falls, to the amount of one-tenth of an inch, indicates a storm eventually, but not a sudden one; and a gale if the fall continues. These storms are not dangerous, as they can be long foretold; but a sudden fall of one-tenth of an inch betokens the quick approach of a dangerous tempest. Alternate rising and sinking (oscillation) indicates unsettled and threatening weather. When the barometer sinks considerably, much wind and rain will follow—from the northward, if the thermometer is low for the season; from the southward, if high. For observing barometric changes, the barometer should be placed at the eye level, out of the reach of sunshine and of artificial heat, as of fires, and out of the way of gusts of wind. It should be set regularly twice a day by a competent person. A card should be accessible close by, and on it should be registered the indication at each setting.

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To the Inventor!

The SCIENTIFIC AMERICAN is indispensable to every inventor, as it not only contains illustrated descriptions of nearly all the best inventions as they come, but each number contains an Official List of the Claims of all the Patents issued from the United States Patent Office during the week previous; thus giving a correct history of the progress of inventions in this country. We are also receiving, every week, the best scientific journals of Great Britain, France and Germany; thus placing in our possession all that is transpiring in mechanical science and art in these old countries. We shall continue to transfer to our columns copious extracts from these journals of whatever we may deem of interest to our readers.

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